SELECTED WATER RESOURCES ABSTRACTS

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JUNE 15, 1975

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A Semimonthly Publication of the Water Resources Scientific Information Center,
Office of Water Research and Technology, U.S. Department of the Interior

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The Secretary of the U. S. Department of the Interior has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through August 31, 1978.

As the Nation's principal conservation agency, the Department of the Interior has responsibility for most of our nationally owned public lands and natural resources. This includes fostering the wisest use of our land and water resources, protecting our fish and wildlife, preserving the environmental and cultural values of our national parks and historical places, and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to assure that their development is in the best interests of all our people. The Department also has a major responsibility for American Indian reservation communities and for people who live in Island Territories under U.S. administration.

FOREWORD

Selected Water Resources Abstracts, a semimonthly journal, includes abstracts of current and earlier pertinent monographs, journal articles, reports, and other publication formats. The contents of these documents cover the water-related aspects of the life, physical, and social sciences as well as related engineering and legal aspects of the characteristics, conservation, control, use, or management of water. Each abstract includes a full bibliographical citation and a set of descriptors or identifiers which are listed in the **Water Resources Thesaurus.** Each abstract entry is classified into ten fields and sixty groups similar to the water resources research categories established by the Committee on Water Resources Research of the Federal Council for Science and Technology.

WRSIC IS NOT PRESENTLY IN A POSITION TO PROVIDE COPIES OF DOCUMENTS ABSTRACTED IN THIS JOURNAL. Sufficient bibliographic information is given to enable readers to order the desired documents from local libraries or other sources.

Selected Water Resources Abstracts is designed to serve the scientific and technical information needs of scientists, engineers, and managers as one of several planned services of the Water Resources Scientific Information Center (WRSIC). The Center was established by the Secretary of the Interior and has been designated by the Federal Council for Science and Technology to serve the water resources community by improving the communication of water-related research results. The Center is pursuing this objective by coordinating and supplementing the existing scientific and technical information activities associated with active research and investigation program in water resources.

To provide WRSIC with input, selected organizations with active water resources research programs are supported as "centers of competence" responsible for selecting, abstracting, and indexing from the current and earlier pertinent literature in specified subject areas.

Additional "centers of competence" have been established in cooperation with the Environmental Protection Agency. A directory of the Centers appears on inside back cover.

Supplementary documentation is being secured from established discipline-oriented abstracting and indexing services. Currently an arrangement is in effect whereby the BioScience Information Service of Biological Abstracts supplies WRSIC with relevant references from the several subject areas of interest to our users. In addition to Biological Abstracts, references are acquired from Bioresearch Index which are without abstracts and therefore also appear abstractless in SWRA. Similar arrangements with other producers of abstracts are contemplated as planned augmentation of the information base.

The input from these Centers, and from the 51 Water Resources Research Institutes administered under the Water Resources Research Act of 1964, as well as input from the grantees and contractors of the Office of Water Research and Technology and other Federal water resource agencies with which the

Center has agreements becomes the information base from which this journal is, and other information services will be, derived; these services include bibliographies, specialized indexes, literature searches, and state-of-the-art reviews.

Comments and suggestions concerning the contents and arrangements of this bulletin are welcome.

Water Resources Scientific Information Center
Office of Water Research and Technology
U.S. Department of the Interior
Washington, D. C. 20240

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01 NATURE OF WATER
Includes the following Groups: Properties; Aqueous Solutions and Suspensions

02 WATER CYCLE
Includes the following Groups: General; Precipitation; Snow, Ice, and Frost; Evaporation and Transpiration; Streamflow and Runoff; Groundwater; Water in Soils; Lakes; Water in Plants; Erosion and Sedimentation; Chemical Processes; Estuaries.

03 WATER SUPPLY AUGMENTATION AND CONSERVATION
Includes the following Groups: Saline Water Conversion; Water Yield Improvement; Use of Water of Impaired Quality; Conservation in Domestic and Municipal Use; Conservation in Industry; Conservation in Agriculture.

04 WATER QUANTITY MANAGEMENT AND CONTROL
Includes the following Groups: Control of Water on the Surface; Groundwater Management; Effects on Water of Man's Non-Water Activities; Watershed Protection.

05 WATER QUALITY MANAGEMENT AND PROTECTION
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07 RESOURCES DATA
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ABSTRACT SOURCES

SELECTED WATER RESOURCES ABSTRACTS

2. WATER CYCLE

2A. General

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
For primary bibliographic entry see Field 4D.
W75-05912

TRANSITION IN RESEARCH ON SMALL FORESTED WATERSHEDS IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. H. Patric, and G. R. Trimble, Jr.
In: National Symposium on Watersheds in Transition, Proceedings Series No. 14, p 272-275, 1972. 21 ref.

Descriptors: *Forest watersheds, Natural resources, *Small watersheds, Water quality, *West Virginia, *Research priorities, Streamflow, Forest management, Water supply, *Watershed management.
Identifiers: *Fernow watersheds(W Va).

The Fernow Watersheds are described, the research on them is summarized, and the hydrologic concepts and other factors that determined research priority are reviewed. (Forest Service)
W75-05919

THE HYDROLOGIC CHARACTERISTICS OF UNDRAINED ORGANIC SOILS IN THE LAKE STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 2G.
W75-05924

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
EOS, Transactions, American Geophysical Union, Vol. 53, No. 1, p 26-28, January 1972.

Descriptors: *Conferences, *Mathematical models, *Reviews, *Analytical techniques, *Simulation analysis, *River basin development, *Water resources, *Watershed management, *Systems analysis, Data acquisition, Network design.
Identifiers: Symposia, Stochastic hydrology, Deterministic hydrology, Lumped systems, Distributed systems, Interdisciplinary research.

A summary is presented of the symposium which was organized under the auspices of the International Association of Scientific Hydrology, an arm of the International Union of Geodesy and Geophysics, with the sponsorship of Unesco and WMO. It was held at the Polish Academy of Sciences in Warsaw. The five-day symposium was divided into 17 sections. A reporter summarized 4 to 7 papers and the authors, if present, were given an opportunity to amplify or correct the reporters' summary. The audience then was able to discuss the papers in each group (all interventions were simultaneously translated into English, Polish, French and Russian). Repeatedly the discussions made it clear that the better models were unique in that they were designed to solve a particular problem--in a particular context of present knowledge, data available, physical and economic constraints, and hydrologic and social goals. From this complex context, several basic patterns of analysis became evident as well as detailed procedures for using each pattern. And in the process the terminology of mathematical models in hydrology was clarified. (Forest Service)
W75-05934

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 7A.
W75-05953

A NONLINEAR TIME VARIANT RAINFALL-RUNOFF MODEL FOR AUGMENTING MONTHLY DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
S. Tuffuor, and J. W. Labadie.
Water Resources Research, Vol 10, No 6, p 1161-1166, December 1974. 5 fig, 2 tab, 16 ref. AID/csd-2460.

Descriptors: *Mathematical models, *Rainfall-runoff relationships, *River basins, Data collections, Model studies, Evapotranspiration, *Hydrologic data, Flooding, Data processing.
Identifiers: *Ghana(Todzie River basin), Developing countries.

Deficiency of data is a serious obstacle to river basin management in developing countries. A lumped, nonlinear, seasonally time variant rainfall-runoff model was applied to the problem of augmenting limited monthly runoff data for the Todzie River basin, Ghana. When the trade-off between model realism (and therefore complexity) and its practical usability for a developing nation is considered, a proper balance may be achieved in the model presented. Though the model is nonlinear, it is simple and easily calibrated or identified by gradient search procedures. The model produced estimates of seasonal evapotranspiration (assuming four distinct seasons per year) that were extremely close to available historical data. It also gave a good fit to available runoff records for the more important wet seasonal flows. (Jess-ISWS)
W75-05957

THE PULVINATE MOSS VEGETATION IN THE KARADJ-VALLEY (ELBURS MOUNTAINS, IRAN), (IN GERMAN),
Tuebingen Univ. (West Germany). Lehrbereich fuer Spezielle Botanik.
W. Frey, and W. Probst.
Bot Jahr Syst Pflanzengesch Pflanzengeogr. Vol 93, No 3, p 404-423, 1973, Illus, English summary.

Descriptors: *Vegetation, *Mosses, Iran.
Identifiers: Karadj Valley(Iran), Elburs Mountains.

The composition and variation in total surface cover of the pulvinate moss vegetation in the Karadj-Valley (Elburs Mountains, Iran) and the surface cover values in N, E, S and W directions from the edge of the mountain range in the south (Karadj) to the high mountain chain (Kandavan Pass) are described. Microclimatic conditions explain the high surface cover measurements. The surface cover values were ascertained at 14 points along the 73 km valley. The total surface cover at the edge of the mountain range is only 0.01%. At the entrance to the valley it rises immediately to about 25% and remains at this value until point 7. However, from points 8-10 the surface cover values rise to over 60% and then decline steadily from point 11 to 3% at point 14. These high values coincide with a short east-west tract in the normally north-south valley. A similar figure is obtained by the fractional surface cover values for the individual exposure zones. The surface cover of the pulvinate mosses is on average higher in the northerly exposed zone and lower in the southerly exposed zone. Maximal peaks of over 50% are reached in the latter zone (point 10, 65%). The pulvinate moss community comprises only a few species. Although the southern part of the Elburs Mountains is influenced by a steppe climate characterized by winter rainfall and summer drought, microclimatic registration during summer 1970 revealed that humid air masses from the north flow over the mountain ridge into the south facing valleys. The daily periodical changes between north and south winds thus result in high humidity in the Karadj-Valley even during summer drought. These climatic peculiarities could be responsible for the growth of the pulvinate mosses.--Copyright 1974, Biological Abstracts, Inc.
W75-05966

A SUB-ALPINE SNOWMELT RUNOFF MODEL,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2C.
W75-05971

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
D.-C. Woo.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 109-120. (1973) 7 ref.

Descriptors: *Runoff forecasting, *Rainfall-runoff relationships, *Small watersheds, Watersheds(Basins), Runoff, Rural areas, Storm runoff, Peak discharge, Flood flow.

Research results of five studies (one national, two feasibility, and two local) which aimed at the development of better practical methods for estimating flood peaks from small rural watersheds (less than 65 sq km) in the continental United States in the last five years were summarized. General descriptions of the approaches employed in the research, the rationale of their selections, and the research results were presented. The present precipitation and small streamflow data are not adequate: they are too few and too short, and not evenly distributed geographically. This situation hampers progress toward the development of accurate general methods of flood prediction for nationwide use. For detailed local studies, some kind of scheme of stratification will be required, and watersheds slightly larger than 65 sq km in size may be included in order to increase the very limited sample size. The research approach should be selected to best suit local conditions and the nature of the available data; although the multiple-regression technique with some variations is the most popular tool used in the analyses. For future research, the need of great expansion of the current national rainfall and runoff data collection program for small rural watersheds, the method of generation of more adequate local rainfall data, the study of the best stratification scheme for regional analysis, and the development of accurate regional or local models should be the immediate major concerns. (See also W75-05973) (Humphreys-ISWS)
W75-05980

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
C. M. Wu.

In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 171-182. (1973) 5 fig, 7 ref, 1 append.

Descriptors: *Flood discharge, *Mathematical models, *Typhoons, *Watersheds(Basins), Model studies, Peak discharge, Rainfall, Orography, Rainfall intensity, Rainfall-runoff relationships, Storm runoff, Circulation, Air circulation, Analytical techniques.
Identifiers: *Taiwan.

A typhoon flood computation model, based on moisture input by a moving typhoon to a watershed and on the response of the river system that is considered analogous to a nonlinear reservoir system, was presented. Typhoon rainfall was divided into two components, circulation and orographic rainfall. A general semi-emperical nonlinear hydrologic system response model was proposed. Use of the model depends upon methods of curve fitting and optimization technique, however, several simpler models are possible based on the general model. (See also W75-05973) (Humphreys-ISWS)
W75-05985

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05986

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
M. Hino.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 211-219. (1973) 8 ref, 1 append.

Descriptors: *Hydrologic systems, *Mathematical studies, *Theoretical analysis, *Runoff, Analytical techniques, Equations, Continuity equation, Hydraulics, Hydrology, Peak runoff, Fourier analysis, Stochastic processes, Hydrographs, Rainfall, Hydrologic aspects, Systems analysis, Analysis.
Identifiers: *Kernel functions, Runoff kernel, Linear runoff kernel, Nonlinear runoff kernel.

Recently, stochastic investigations of runoff processes as a lumped hydrological system have been advanced considerably because of the progress in stochastic methods of data analysis. On the other hand, researchers following the dynamic hydrology cirticize the results obtained stochastically, such as linear and nonlinear runoff kernels, are empirical. An analysis was presented to theoretically bridge the stochastic analysis of a lumped water system and the dynamic analysis of hydrological processes and to deepen understanding of the fundamental hydrologic and river flow processes. The theory was developed by applying the Cameron-Martin-Wiener functional expansion method to the equation of motion (in this study, resistance formula) and the continuity of water flow in an open channel. The linear and nonlinear response kernels for an idealized hydrologic basin were derived. (See also W75-05973) (Humphreys-ISWS)
W75-05988

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05992

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
M. C. Chaturvedi, S. Chander, and B. S. Mathur.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 265-275 (1973). 3 fig, 1 tab, 6 ref.

Descriptors: *Flood discharge, *Hydrograph analysis, *Hydrologic systems, Watersheds(Basins), Rainfall-runoff relationships, Storm runoff, Rainfall, Distribution patterns, Hydrographs, Spatial distribution, Large watersheds, Model studies, Mathematical models.

A catchment response model to take into account nonuniform rainfall distribution was developed and satisfactorily tested. The proposed model is different from others as the input rainfall is treated as distributed and not lumped. The phenomenon was conceptually explained through linear channels which are tools of translation only. Linear channel is a conceptual approach and may not be compared with a hydraulic channel which has its own storage. Instead, the adopted linear channel translates the input which it receives from a prefixed area, termed as subwatershed, which accounts for the storage effect. Each subwatershed was treated as an assembly of 'subareas' which may have different amounts of precipitation, thereby taking into account the nonuniformity of rainfall as well as the catchment. This model was tested and verified on medium sized natural catchments in different meteorological zones in India. The model can be applied to large catchments and is being verified for these conditions. (See also W75-05973) (Humphreys-ISWS)
W75-05993

FLOOD WARNING THROUGH A HYDROLOGICAL-CUM-MATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
For primary bibliographic entry see Field 4A.
W75-06004

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
T. Ito.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4. Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 409-417. (1973) 7 fig.

Descriptors: *Flood forecasting, *Mathematical models, *River forecasting, Equations, Flood discharge, Water levels, Rivers, Tributaries, Junctions, Reservoirs, Runoff, Floods, Precipitation(Atmospheric), Rainfall-runoff relationships, Roughness(Hydraulic).
Identifiers: *Japan.

A flood prediction method by digital computer was described. Factors considered in the mathematical model included precipitation when river length is short, runoff, channel roughness coefficient, tributary junction, and reservoir. After taking these factors into consideration, the variation of unsteady flow was calculated stepwise. For the prediction of precipitation, a prepared regression formula that combines the local precipitation with meteorological data at high altitude was used. In Japan, these data are broadcasted twice a day. Owing to the prediction of precipitation, runoff in a river at a definite point was also predicted and then propagation of flood downstream was calculated by digital computer. In a test run computer time was 500 seconds for a flood duration of 40 hours. It was concluded that the mathematical flood prediction model can be applied to every type of river. (See also W75-05973) (Humphreys-ISWS)
W75-06005

REVERSED LONGITUDINAL SALINITY PROFILE OF A MAJOR RIVER IN THE SOUTH-WEST OF WESTERN AUSTRALIA,
Western Australian Dept. of Fisheries and Fauna, Perth. Marine Research Labs.
For primary bibliographic entry see Field 5B.
W75-06112

AN IMPLICIT METHOD TO SOLVE SAINT VENANT EQUATIONS,
Centro di Ricerca IBM di Pisa (Italy).
For primary bibliographic entry see Field 2E.
W75-06119

A SIMPLE PROCEDURE FOR SYNTHESIZING DIRECT RUNOFF HYDROGRAPHS,
University of the Witwatersrand, Johannesburg (South Africa).
S. W. Bauer, and D. C. Midgley.
Report No. 1/74, March 1974. 55 p, 10 fig, 5 tab, 12 ref, 3 append.

Descriptors: *Hydrograph analysis, *Unit hydrographs, *Flood routing, *Rainfall-runoff relationships, Floods, Hydrographs, Hydrology, *Synthetic hydrology, Surplus water, *Watersheds(Basins), Reservoir storage, Vegetation, Estimating, Precipitation excess, Hydraulics, Rainfall, Runoff.
Identifiers: South Africa.

Recent attempts to synthesize unitgraphs by routing procedures have revealed that, provided the catchment area does not exceed 10,000 sq km and is not of unusual shape, the direct runoff hydrograph resulting from uniformly distributed rain can be reproduced with reasonable accuracy by Nash-Muskingum routing of excess rain through a single reservoir-type storage, thus dispensing with conventional intermediary unitgraph steps. To test the validity of the method, direct runoff hydrographs were synthesized for uniformly distributed unit excess rain on 92 South African catchments. When these were compared with the corresponding unitgraphs derived from observed river flows, agreement was in general highly satisfactory. The storage through which excess rain is to be routed, the Muskingum routing K, was dependent primarily upon area of catchment and vegetal cover and it was therefore possible to provide a generalized basis for estimating appropriate K values. The suggested procedure was explained, the validity tests were demonstrated, and a comparison between the proposed method and the conventional unitgraph technique was illustrated. A guide in the form of a diagram and regional map for estimating Muskingum routing K values appropriate to South African catchments was included. (Dawes-ISWS)
W75-06123

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
M. H. Diskin, and A. Boneh.
Journal of Hydrology, Vol 24, No 1/2, p 57-76, January 1975. 7 fig, 4 tab, 22 ref, append.

Descriptors: *Unit hydrographs, *Storms, *Runoff, *Optimization, *Analytical techniques, Hydrologic data, Systems analysis, Statistical methods, Rainfall, Surface runoff, Numerical analysis, Hydrograph analysis, Watersheds(Basins).
Identifiers: *Instantaneous unit hydrograph, Kernel function, Objective function.

Rainfall excess and direct surface runoff records from a number of independent storms in a given watershed were used to derive an optimal instantaneous unit hydrograph (IUH) for that watershed. The watershed was represented by a linear, time invariant, lumped system. The IUH is the kernel function of the surface runoff thus defined. Discrete representation of the input, output, and kernel functions led to a set of linear equations in which the ordinates of the IUH were the unknowns. Time bases of the output curves of the various storms were so adjusted as to produce a constant difference between the time bases of output and input curves for all storms. The total depth of output was made equal to the total depth of input. The solution method adopted was an optimization procedure that minimizes the sum of squared deviations between observed values of the output function and those predicted by the IUH ordinates. The IUH considered was subject to two constraints: all of its ordinates must be nonnegative and the area enclosed by the IUH must be unity. Minimization of squared deviations over all storms eliminated the need for averaging individual IUHs. A numerical example based on field data was presented. (Singh-ISWS)
W75-06127

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06138

SURFACE RUNOFF HYDROGRAPH EQUATION,
Nevada Univ., Reno. Center for Water Resources Research.
V. L. Gupta, and S. A. Moin.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 100, No HY10, Proceedings Paper 10880, p 1353-1368, October 1974. 11 fig, 2 tab, 17 ref, 3 append. OWRT A-057-NEV(2).

Descriptors: *Hydrograph analysis, *Hydrology, *Great Basin, *Peak discharge, *Recession curves, *Runoff, California, Hydraulics, Reservoirs, Mathematical models, Drainage area, Surface waters, Withdrawal, Hydrographs, Surface runoff, Watersheds(Basins).
Identifiers: Bloomberg's equation, Reservoir performance, Peak runoff.

Bloomberg's equation (based on Edson's equation) for the description of surface runoff hydrographs was modified and a methodology was developed to express the shape and profile of rising limb, crest segment, and recession limb of a hydrograph in algebraic terms. Variables of concern for such a description included time to peak, peak rate of runoff, point of recession, recession constant, and the percentage ratio of flow volumes in recession to the total volume of surface runoff. A computerized procedure, based on the derived formulations and working rules, would facilitate tracing of the surface runoff hydrograph free of reliance on graphical procedures. The method was applied to nine arbitrarily chosen drainage areas in the Great Basin region in order to investigate the reproducibility of observed unimodal flood hydrograph events. (Singh-ISWS)
W75-06139

WATERSHED BEHAVIOR UNDER CONTROLLED SIMULATED RAINFALL,
Pennsylvania State Univ., University Park. School of Forest Resources.
J. A. Lynch, W. E. Sopper, and E. S. Corbett.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 921, $4.75 in paper copy, $2.25 in microfiche. Pennsylvania Institute for Research on Land and Water Resources, University Park, Completion Report, December 1974. 71 p, 26 fig, 14 tab, 68 ref. OWRT B-028-PA(2). 14-31-0001-3124.

Descriptors: *Forestry, *Drainage water, *Watersheds(Basins), *Irrigation system, *Simulated rainfall, Storm runoff, Subsurface runoff, Small watersheds, *Soil moisture, Slopes, Forest watersheds, Peak discharge storms.
Identifiers: Hydrologic behavior, Antecedent soil moisture, *Storm size, Channel area, Total runoff, Storm hydrograph characteristics, Peakflow rate, Quickflow volume, Lower slope, Upper slope, Ridge top.

For hydrologic behavior and response of a small, natural forested drainage basin, as irrigation system was designed and installed to apply uniformly simulated rainfall on any/all parts of a 20-acre watershed. Effects of antecedent soil moisture and storm size on simulated rainfall disposition and storm hydrograph characteristics were analyzed. Hydrologic behavior and response of the watershed to controlled area applications of simulated rainfall were evaluated. High antecedent soil moisture content increased quickflow volume and peakflow rate, decreased time to peak, time of recession and storm duration. Increased storm runoff from increased storm size occurred as quickflow. Subsurface stormflow accounted for the majority of the quickflow volume regardless of storm size. Time to peakflow was delayed as storm size increased. Importance of the channel area in contributing to peak discharge decreased as storm size increased. Quickflow accounted for most of the total runoff regardless of the area of application; the channel and lower slope produced somewhat more than the upper slope and ridge top. (Sink-Penn State)
W75-06192

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
B-H. Lee.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 901, $7.25 in paper copy, $2.25 in microfiche. PhD Thesis, December 1973. 201 p, 36 fig, 26 tab, 3 append. OWRR B-041-PA(3). 14-31-0001-3635.

Descriptors: *Storm runoff, *Unit hydrographs, *Rainfall-runoff relationships, *Pennsylvania, Equations, Precipitation excess, Forecasting, *Runoff forecasting, Temporal distribution, Small watersheds, Model studies, Floods.
Identifiers: Storm flood records, Time-distribution, Antecedent wetness conditions, Watershed soil information, Soil-cover complex matrix, Antecedent dryness indices, Watershed dryness, Double triangle models.

An attempt was made to present a practical device for predicting sequential storm runoff volumes in such a manner that can be applied to unit hydrograph techniques. The data used were abstracted from the storm flood records of Pennsylvania watersheds. A new rainfall-runoff equation is derived with emphasis on its capability to describe the time-distribution of a rainfall excess during an entire rainstorm. A functional parameter introduced into the equation is determined according to antecedent wetness conditions and watershed soil information. Soil characteristic values are optimized for each component of the newly organized soil-cover complex matrix using an established relationship between antecedent dryness indices and watershed dryness. The unit hydrograph prediction methods based on a double triangle model are applied to formulating a procedure of design flood hydrograph synthesis, together with the new rainfall-runoff equation. The techniques developed are applicable to small watersheds, ranging in size between 3 and 200 square miles, in the humid northeastern regions of the United States.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. G. Heerdegan.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 891, $5.25 in paper copy, $2.25 in microfiche. MSc Thesis, August 1973. 104 p, 12 fig, 16 tab, 12 ref. OWRT B-041-PA(1). 14-31-0001-3635.

Descriptors: *Unit hydrographs, *Watersheds(Basins), *Physical properties, Physiographic provinces, Seasonal, Geomorphology, Climates, *Pennsylvania, Rainfall-runoff relationships.
Identifiers: Climatic contrasts.

It has been recognized by many authors that unit hydrographs vary from watershed since each represents a unique combination of physical characteristics which affect the volume and timing of the water outflow. It also has been concluded that variations in unit hydrographs should not occur within a watershed if all of the assumptions of the unit hydrograph theory are met. The validity of these arguments was tested by introducing both a wide range of physical differences in a sample of 17 watersheds in Pennsylvania, and within the 96 flood events that constitute the sample, an equally wide range of climatic and storm differences. An inspection of the data shows that real differences in unit hydrographs occur both among and within watersheds. This led to the formulation of hypotheses that state that differences among watersheds are the results of physiographic differences while the differences within watersheds are the results of climatic contrasts. There are differences enough in the physiographic parameters and climatic variables by watershed, physiographic province and season, to enable these differneces to be reflected in the unit hydrograph if such response takes place.
W75-06196

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
D. A. Telleck.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 902, $5.25 in paper copy, $2.25 in microfiche. MSc Thesis, August 1973. 91 p, 15 fig, 9 tab, 19 ref, 5 append. OWRR B-041-PA(2). 14-31-0001-3635.

Descriptors: *Flood forecasting, *Antecedent precipitation, *Peak discharge, *Watershed management, Soil environment, Retention, Temperature, Rainfall, *Pennsylvania, *Small watersheds, Optimization, Rainfall-runoff relationships, *Precipitation(Atmospheric).
Identifiers: Watershed parameters, Mean annual flood, Flood runoff, Flood response, Precipitation duration.

The study used 98 flood events on 12 watersheds located throughout Pennsylvania. Watershed areas ranged from 4 to 175 square miles. Search for an optimal antecedent precipitation index led to using the classical API, (total rainfall in a period of days prior to the flood event), and two other relatively new forms, DRI and APIDRI. Some 21 antecedent precipitation indices were examined to determine the optimal index or indices. After stratifying the data by physiographic provinces and season, multiple regression methods were used to determine the optimal antecedent precipitation index to use with climatic factors, storm variables and watershed parameters to predict PKRATIO (ratio of instantaneous peak discharge to mean annual flood) or VOL (volume of flood runoff). Results showed that AP indices account for 20% of the variation of PKRATIO and about 7% of the VOL variation. Except for the Valley and Ridge subsample, antecedent precipitation was not a strong flood response predictor. Future study recommen-

dations include using temperature, precipitation, and precipitation duration antecedent conditions with soil cover characteristics to quantify the relationship between antecedent soil moisture conditions and the potential retention capacity of a soil cover complex. (Sink-Penn State)
W75-06201

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
For primary bibliographic entry see Field 2H.
W75-06243

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
V. L. Gupta, V. Thongchareon, and S. M. A. Moin.
Hydrological Sciences Bulletin, Vol 19, No 4, p 523-540, December 1974. 5 fig, 5 tab, 23 ref, 3 append.

Descriptors: *Hydrographs, *Hydrologic data, *Analytical techniques, *Hydrograph analysis, *Watersheds(Basins), Graphical methods, Data processing, Streamflow, Regional analysis, Surface runoff, Modeling.
Identifiers: *Thailand, *Dimensionless hydrographs, Mune and Chee Rivers.

Observed streamflow hydrographs for 9 basins in northeast Thailand were analyzed to obtain characteristic dimensionless hydrographs. Separation of the flood hydrograph into components of baseflow, interflow, and direct surface runoff was accomplished via graphical procedures. The parameters of the resulting surface runoff hydrographs were evaluated by using Edson's hydrograph equation. These parameters were used in developing dimensionless hydrograph equations. Comparison of observed and developed dimensionless hydrographs indicated that the rising limbs of these hydrographs as well as the recession limbs do not match. The deviations were attributed to baseflow separation, physical characteristics of basins, and data errors. (Singh-ISWS)
W75-06269

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
T. R. E. Chidley, and I. M. Goodwill.
Journal of Hydrology, Vol 24, No 1/2, p 155-169, January 1975. 6 fig, 2 tab, 10 ref.

Descriptors: *Computer models, *Simulation analysis, Systems analysis, Synthetic hydrology, Operations research, Computers, Watersheds(Basins), Drainage programs, Computer programs, *Model studies.
Identifiers: *Mahalapshwe Watershed(Botswana), Developing countries.

A general procedure for watershed simulation and drainage network studies was described for use with a small-size computer (i.e., 8K x 16 bit word plus one disc transport). A system framework can be created to make a wide variety of watershed model and river routing techniques available. Separation of input/output functions and generalization of parameters were methods used in rendering simple modification and extension of the system. An example of an actual watershed model was included. (Jess-ISWS)
W75-06286

RELATIONSHIPS BETWEEN RAINFALL PARAMETERS AND INTERCEPTION BY TROPICAL FOREST,
New England Univ., Armidale (Australia).
For primary bibliographic entry see Field 2B.
W75-06291

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
D. C. Ledger.
Journal of Hydrology, Vol 24, No 3/4, p 207-214, February 1975. 1 fig, 5 tab, 7 ref.

Descriptors: *Water balance, *Precipitation(Atmospheric), *Watersheds(Basins), Evaporation, Runoff, Flood discharge, Hydrology, Evapotranspiration, Dry seasons, Wet seasons, Hydrologic data, Africa.
Identifiers: *West Africa(Sierra Leone), Guma Reservoir.

Precipitation, evaporation, and runoff data for a small catchment in the exceptionally wet Freetown peninsula region of Sierra Leone, West Africa, were described and analyzed. In most respects, the water balance characteristics of this catchment (Guma) were similar to those encountered in many parts of West Africa. There is a wet season characterized by high precipitation and low evapotranspiration during July, August, and September. The evidence suggests that both long and short term precipitation and runoff rates were 300% more than those generally associated with West Africa; a flood discharge of 23,000 cu m/sec/sq km is a particularly notable event. Few other catchments in the world can experience conditions as wet as these. (Roberts-ISWS)
W75-06292

2B. Precipitation

AGROMETEOROLOGICAL FORECASTING, AN IMPORTANT MEANS FOR DECISION MAKING IN AGRICULTURE (IN FRENCH),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
O. Berbecel, M. Eftimescu, N. Ciovica, and L. Rahau.
Bull Acad Sci Agric For. 2. p 99-111, 1973, Illus.

Descriptors: Meteorology, *Weather forecasting, Climatic data, *Agriculture, *Precipitation(Atmospheric), Rainfall, Droughts, *Agroclimatology.
Identifiers: Agrometeorological forecasting.

The question of whether some kind of order exists in the succession and duration of climatic anomalies and whether such anomalies can be predicted is discussed. The time span for which objective meteorological data are available for different zones of the planet is too short to derive from them laws governing variations in climatic conditions over decades and centuries, but in spite of this certain indicators (y tree rings, river beds, littoral of enclosed seas) permit certain conclusions to be reached about the climate of the past. These data together with certain indicators of purely meteorological character permit the elaboration of agrometeorological forecasting for from 2-3 wk up to 6 mo. into the future. Of special importance is pluviometric forecasting which is based on multiannual records concerning droughts. Statistics show that periods of normal rainfall account for only 30% of the time, rainy periods are never followed by periods of normal rainfall but always by droughts. Such observations on temperature cycles form the basis of agrometeorological forecasting.--Copyright 1974, Biological Abstracts, Inc.
W75-05855

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05985

INSTRUMENTS FOR INVESTIGATION OF FOGS AND CLOUDS AND MEASUREMENT OF HUMIDITY,
V. A. Zaytsev, and A. A. Ledokhovich.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-779 207, $3.75 in paper copy, $2.25 in microfiche. Air Force Systems Command Foreign Technology Division Report No. FTD-MT-24-398-74, April 1974. 18 p, 9 fig, 2 tab. Translated from Pribory Dlya Issledovaniya Tumanov i Oblakov i Izmereniya Vlazhnosti, p 72-86, 1970.

Descriptors: *Instrumentation, *Measurement, *Clouds, *Precipitation(Atmospheric), Meteorology, Fog, Humidity, Cloud physics, Weather, Aircraft, Weather data, Drops(Fluids), Sampling, Meteorological data.
Identifiers: Water content.

A combined aircraft-carried water-content meter and an electric water-content meter were described. The aircraft-carried meter consists of a probe that can be inserted into the airstream through an opening in the aircraft. Two interchangeable nozzles are used with this probe. The first nozzle records drop size data by a filter paper technique. The second nozzle is a drop absorbing device. This nozzle is weighed before and after exposure in order to measure the amount of water collected. From the measurements of these two nozzles, water content and equivalent rainfall rate are calculated. The various sources of errors were discussed. The electric water-content meter uses a bridge circuit to measure the temperature difference between an element exposed to cloud particles and a similar element protected from these particles. The cooling effects of the cloud particles are related to the water content. References and appendixes in the original report were not included in the translation. (Sims-ISWS)
W75-06041

BASES OF METHOD AND MEANS OF MODIFICATION OF HAIL PROCESSES,
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
For primary bibliographic entry see Field 3B.
W75-06126

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
For primary bibliographic entry see Field 2H.
W75-06243

RELATIVE IMPORTANCE OF METEOROLOGICAL VARIABLES IN SNOWMELT,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
For primary bibliographic entry see Field 2C.
W75-06263

CORRECTION FOR THE WETTING LOSS OF A HELLMANN PRECIPITATION GAUGE,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
For primary bibliographic entry see Field 7B.
W75-06267

THE REDESIGN OF THE RAINGAUGE NETWORK OF ZAMBIA,
Hydrometeorologicky Ustav, Prague (Czechoslovakia).
For primary bibliographic entry see Field 7A.
W75-06268

AIR BUBBLES IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
For primary bibliographic entry see Field 2C.
W75-06275

THE WATER DROP REBOUND PROBLEM: DYNAMICS OF COLLISION,
Arizona Univ., Tucson. Inst. of Atmospheric Physics.
G. B. Foote.
Journal of the Atmospheric Sciences, Vol 32, No 2, p 390-402, February 1975. 13 fig, 24 ref. NSF Grant GA-24134.

Descriptors: *Drops(Fluids), *Meteorology, Movement, Numerical analysis, Shape, Weber number, Deformation, Energy, Impact(Rainfall).
Identifiers: *Drop collisions, Rebound, Dynamics of liquid drops, Navier-Stokes equation, Internal motion, Drop oscillations.

A method for studying the dynamics of liquid drops by numerical integration of the Navier-Stokes equations was used to examine the motion of colliding drops, with application to the raindrop problem. Consideration was limited to drops of nearly equal size impacting along their line of centers. The numerical solutions were developed to study the problem of water drop rebound in the presence of air, a situation in which the drops fail to make physical contact, but the results also have application to a wider variety of phenomena. The internal motion of the drop, changes in the surface configuration, and the associated energetics of the collision were discussed. The variations with impact speed were presented. Calculations were made for drops of 40 micrometers to 1 millimeter diameter. It was demonstrated that except for a small viscous effect the collision characteristics, including the drop shape at the stage of maximum deformation and the time for rebound, suitably normalized, are uniquely determined by the Weber number (We) for the drop. The functional relations were shown for We less than 5. It was found that over a large range of We the bouncing time is close to the lowest-order period of oscillation, and hence varies essentially as the square root of the drop mass. Comparison of the results with available experimental data showed good agreement. (Jones-ISWS)
W75-06278

RELATIONSHIPS BETWEEN RAINFALL PARAMETERS AND INTERCEPTION BY TROPICAL FOREST,
New England Univ., Armidale (Australia).
I. J. Jackson.
Journal of Hydrology, Vol 24, No 3/4, p 215-238, February 1975. 6 fig, 8 tab, 25 ref.

Descriptors: *Rainfall, *Tropical regions, *Interception, Vegetation, Drainage, Throughfall, Rain forests, Stemflow, Evaporation, Precipitation(Atmospheric), Saturation, Canopy, Equations, Rainfall intensity.
Identifiers: *Tanzania, Gross rainfall, Net rainfall evaporation.

The process of rainfall interception by vegetation was discussed and related to a number of variables including rainfall intensity, duration, and intervals between storms in East Africa. In general terms, the results were not encouraging. Differences between data sets and regression models were apparent. The gross rainfall model that combined day and night single falls was marginally better than when intermittent falls were added. Similarly, the multiple-regression analysis of intermittent falls was unsatisfactory, and together with the complexity of these situations, suggested that their separation from single rainfall periods is worthwhile. The disappointing results of this analysis under tropical conditions, particularly high rainfall and evaporation rates, may not be relevent to higher latitudes. Even for single falls, 'averaging' of intensity over the rain period was a problem. The effects of wind shake and variations in evaporation rate during and between storms complicated the picture. In addition, measurement errors were not considered. Only a very detailed water-balance approach will be satisfactory. Unfortunately, such an approach is impossible for many investigations where a knowledge of interception is required, particularly in developing countries subject to financial and manpower restraints. (Roberts-ISWS)
W75-06291

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
For primary bibliographic entry see Field 2A.
W75-06292

CORRELATION ANALYSIS OF THE CELLULAR STRUCTURE OF STORMS OBSERVED BY RAINGAUGES,
Lancaster Univ., Bailrigg (England). Dept. of Environment Sciences.
D. G. Felgate, and D. G. Read.
Journal of Hydrology, Vol 24, No 3/4, p 191-200, February 1975. 4 fig, 2 tab, 22 ref.

Descriptors: *Precipitation(Atmospheric), *Rainfall intensity, *Rain gages, Storms, Numerical analysis, Winds, Correlation analysis, Analytical techniques, Rainfall.
Identifiers: Rain cells, Cross-correlation functions, England(Cardington).

Storm rainfall patterns often show random cellular structure which can be described by both spatial and temporal correlation functions calculated from short-interval precipitation measurements. A network of 16 raingages with approximately 1-km spacings was operated at Cardington by the British Meteorological Office from 1957 to 1962. The gages measured the amount of rain falling in intervals of two minutes during a series of mainly summer storms. Techniques developed for the study of moving diffraction patterns produced by radio sounding the ionosphere were applied to this data. The spatial scale of the pattern, its velocity, and its mean lifetime may be deduced from the time variations in rainfall recorded at three suitably spaced gages. This analysis was applied to various groups of gage records from a particularly long storm and has shown good agreement with the relevant upper air data. A dominant surface rainfall 'cell' size of 2.8 km by 1.3 km was found from the two-minute total rainfall records. This initial study demonstrated the potential of this correlation technique in describing the small scale structure of rainstorms, in quantitative terms, by using records from a small number of fast-response gages. (Jones-ISWS)
W75-06293

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 2I.
W75-06317

2C. Snow, Ice, and Frost

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05913

A SUB-ALPINE SNOWMELT RUNOFF MODEL,
Wyoming Univ., Laramie. Dept. of Civil Engineering.
L. E. Allen.
Available from the National Technical Information Service, Springfield, VA. 22161 as PB-240 754. $11.25 in paper copy, $2.25 in microfiche. PhD Thesis, May 1974. 407 p, 10 fig, 8 tab, 95 ref, 6 append. OWRT-A-010-WYO(3).

Descriptors: *Snowmelt, *Watersheds(Basins), *Model studies, *Runoff, Hydrology, Hydrographs, Daily hydrographs, Streamflow, Streamflow forecasting, Hydrologic aspects, Routing, Precipitation(Atmospheric), Computer models, Topography, Hydrologic data, Computer programs, Runoff forecasting, Snow cover, Snow, Rocky Mountain region, *Wyoming, Discharge(Water), On-site data collections.
Identifiers: North Fork basin(Wyo), Subalpine region.

A digital computer model for simulating daily watershed runoff from snowmelt under subalpine conditions was developed in first generation form for the Nash Fork basin in southeastern Wyoming. Solar radiation is the primary energy source for snowmelt, and its interaction with the snowpack is the core of the model. The watershed was subdivided into segments, one segment on either side of a stream reach, and each segment was divided by cover condition into a forested and an unforested area. Snow distribution patterns were consistent as to time. The areal extent of snowcover was calculated with a submodel derived through stepwise multiple regression techniques. Insolation, measured in or near the basin, was adjusted to the latitude, slope, and aspect of each segment in the basin, then adjusted for the albedo of the snow surface and combined with the long wave radiation flux for the net radiation exchange producing potential snowmelts. These snowmelts were adjusted for snowpack conditions, snowcover areas, and for rainfall effects, resulting in the runoff from each cover condition of each segment for each day. The runoff were then routed through flow points as daily discharges for the model output. Comparison of simulated flows with observed flows indicated reasonably satisfactory model performance. Appendixes contain program variable definitions, model user instructions, program listing, tabulated data, calculated hydrographs, and observed and calculated streamflows. (Humpreys-ISWS)
W75-05971

INVESTIGATION OF SOLAR ENERGY FOR ICE MELTING.
Armour Research Foundation, Chicago, Ill.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 111, $4.25 in paper copy, $2.25 in microfiche. Final Report, June 1, 1949. 54 p, 4 fig, 4 tab, 22 ref, append.

Descriptors: *Ice, *Iced lakes, *Lake ice, Solar radiation, Melting, Heat transfer, Lakes, Rivers, Absorption, Temperature.

The possibility of melting ice formed on the surfaces of rivers and lakes in the northern parts of the United States by applying a layer of a material that would absorb more of the available solar energy was investigated. The following studies were made: (1)Heat losses from water surfaces during the winter months were calculated based on a literature survey. Under the conditions existing in the northern United States, the growth of an ice sheet and the effect of the solar energy absorbed on the rate of the ice formation was analyzed. (2) The effect of an absorbent layer applied to the ice surface on the growth of the ice sheet was studied. The extent to which the melting rate could be altered by such a layer was investigated. In all these analyses steady state conditions were assumed. Results were: (1) When conditions are such that melting does not occur, the addition of an absorbent layer would make the melting possible if the

air temperature is about 32F and the intensity of solar energy is that prevailing during February and March. (2) An absorbent layer would increase the rate of melting by a factor of 2 to 3 when melting takes place under natural conditions. (Sims-ISWS)
W75-06135

LABORATORY PREPARATION OF ARTIFICIAL SEA AND SALT ICE,
Cold Regions Research and Engineering Lab., Hanover, N.H.
W. F. Weeks, and G. F. N. Cox.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 694, $3.25 in paper copy, $2.25 in microfiche. Special Report 206, June 1974. 13 p, 4 fig, 36 ref.

Descriptors: *Ice, *Sea ice, *Laboratory tests, Laboratory equipment, Research and development, Ice-water interfaces, Sea water, Freezing, Salinity, Crystal growth, Crystals.
Identifiers: *Artificial ice, *Salt ice.

The characteristics of several successful schemes that have been used to produce artificial sea and salt ice for laboratory studies were described. Difficulties that have been encountered in developing suitable experimental designs for investigating a variety of specific sea ice problems (salinity, grain size, substructure and orientation variations; preparation of single crystals and underwater ice) were discussed and suggestions were given for improved methods. (Sims-ISWS)
W75-06253

ICE ENGINEERING - QUANTIFICATION OF SUBSURFACE ICE THICKENING TECHNIQUES,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
J. L. Barthelemy.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-781 640, $3.75 in paper copy, $2.25 in microfiche. Technical Report R-811, May 1974. 37 p, 19 fig, 18 ref, 3 append.

Descriptors: *Ice, *Civil engineering, *Freezing, *Construction, Ice-water interfaces, Sea ice, Ice loads, Cold regions, Cold weather construction, Laboratory tests, On-site investigations, Equations.
Identifiers: Ice growth, Ice engineering, Freezing cells, Subsurface ice thickening.

Because of the extreme conditions and the lack of readily available building materials in polar regions, construction by conventional means is often unfeasible. Methods involving the localized freezing of seawater into useful structures at coastal polar locations are being developed. One technique previously developed and tested is surface flooding. An alternate method involves subsurface thickening by short-circuiting the insulating property of an existing ice sheet. Especially promising are natural-convection heat exchangers called freezing cells. These devices are simply constructed, self-powered, and easily installed. Their performance and ice production capabilities were described by a series of equations, presented in generalized (dimensionless) form so as to be applicable to a system of any size. The theoretical development was supported by laboratory and field-test results. Analysis indicates that these devices, although limited to low operating efficiencies, are preferable to the more efficient but complex systems which increase size, weight, and operational requirements. (Sims-ISWS)
W75-06254

RELATIVE IMPORTANCE OF METEOROLOGICAL VARIABLES IN SNOWMELT,
Agricultural Research Service, Boise, Idaho. Northwest Watershed Research Center.
J. F. Zuzel, and L. M. Cox.
Water Resources Research, Vol 11, No 1, p 174-176, February 1975. 6 tab, 11 ref.

Descriptors: *Snowmelt, *Meteorological data, *Forecasting, Regression analysis, Winds, Air temperature, Vapor pressure, Radiation, *Idaho, Correlation analysis.
Identifiers: Net radiation, Boise(Idaho).

To improve predictive equations of the snowmelt process, the relative importance of various meteorological parameters must be understood. Factor analysis and regression analysis were used to determine the effectiveness of wind, air temperature, vapor pressure, and net radiation in predicting snowmelt. Analyses of meteorological and snowmelt data collected at a site near Boise, Idaho, in May 1973 showed that the standard error of daily snowmelt prediction could be decreased 13% by using vapor pressure, net radiation, and wind in predictive equations rather than just air temperature. (Jones-ISWS)
W75-06263

EVAPORATION FROM SNOW COVER,
Finnish Hydrological Office, Helsinki.
For primary bibliographic entry see Field 2D.
W75-06271

DETERMINATION OF SNOW WATER EQUIVALENT AND SNOWMELT WATER BY THICKNESS OF SNOW COVER DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
G. Kovacs, and G. Molnar.
Hydrological Sciences Bulletin, Vol 19, No 4, p 435-447, December 1974. 6 fig, 4 tab, 30 ref.

Descriptors: *Snowmelt, *Snowpacks, *Bulk density, Snow cover, Stratification, Melt water, Water equivalent, Equations.
Identifiers: *Hungary.

In studies on the accumulation and melting processes of snow, bulk densities were determined for fresh snow (gamma sub min), for snow saturated by capillary water (gamma sub k), and for melting snow (gamma sub max). Correlation studies showed the magnitudes of gamma sub k and gamma sub max to depend greatly on the number (R) of snow layers. The equations involving the bulk densities listed above form the basis of the computation charts prepared by the authors. These can be applied to two thus far unsolved problems: (1) the reconstruction of past time series of water equivalent values for observing stations with data on the thickness of the snow cover only, and (2) forecasting the volume of snowmelt water from data of the thickness of the cover and duration of the melting period. (Jones-ISWS)
W75-06272

AIR BUBBLES IN ACCRETED ICE,
Western Australia Univ., Nedlands. Dept. of Physics.
J. N. Carras, and W. C. Macklin.
Quarterly Journal of the Royal Meteorological Society, Vol 101, No 427, p 127-146, January 1975. 14 fig, 3 tab, 25 ref.

Descriptors: *Ice, *Bubbles, *Hail, Physical properties, Laboratory tests, Freezing, Meteorology, Cloud physics, Measurement.

On the assumption that the concentration of air bubbles formed in freezing water is a function of the freezing rate, an expression for the concentration of air bubbles in accreted ice was deduced. This expression was confirmed by measurements of the bubble concentrations and size distributions in frozen bulk water and in ice accreted on rotating cylinders. Consequently, in both the wet and dry growth regimes it is the rate of freezing which essentially determines the bubble concentration. The size distribution of bubbles is determined by the amount of air available for bubble growth. This depends on the rate at which air diffuses out of the individual droplets during the freezing process. In the wet growth regime the freezing rate depends on the rate at which heat is dissipated from the accreting object by forced convection and also, depending on the fraction of unfrozen water, on the way in which the spongy deposits are finally frozen. In the dry growth regime the freezing rate of the accreted droplets depends on their size and speed of impact, since these determine the extent to which the droplets spread, and on the temperature of the deposit. The air bubble concentrations and size distributions were determined. (Sims-ISWS)
W75-06275

FREEZING RATES OF WATER DROPLETS,
University of New England, Armidale (Australia). Dept. of Physics.
W. D. King.
Journal of the Atmospheric Sciences, Vol 32, No 2, p 403-408, February 1975. 2 fig, 13 ref, 1 append.

Descriptors: *Drops(Fluids), *Freezing, Ice, Heat flow, Supercooling, Numerical analysis.
Identifiers: *Freezing rates.

The freezing rates of water droplets were calculated. The interfacial position was specified as a power series in time, and expressions for determining the first five coefficients were given. The five-term series solution was compared with an exact numerical one for a particular case, and the agreement was within 1% during most of the freezing process. For small droplets, the solution reduced to a previously published one, and the results of experiments in which the freezing times of droplets were measured confirmed this. (Jones-ISWS)
W75-06277

DEGLACIATION OF THE LABRADOR CONTINENTAL SHELF,
Bedford Inst., Dartmouth, (Nova Scotia). Atlantic Geoscience Center.
R. H. Fillon.
Nature, Vol 253, No 5491, p 429-431, February 6, 1975. 3 fig, 29 ref.

Descriptors: *Glaciers, *Glacial drift, *Continental shelf, Ice cover, Glaciology, Ice breakup, Climatology, Sea ice, Atlantic Ocean, Ice, Geomorphology, Topography, Oceanography, Remote sensing.
Identifiers: Hamilton Bank, *Labrador Shelf.

It has long been inferred from studies of glacial features on land that the North American Quaternary glaciers extended far out on the Atlantic continental shelf. Only within the last ten years, however, have offshore studies on the Scotian Shelf convincingly demonstrated the presence of a system of submarine moraines. Moraines and other relict glacial land forms on the outer Labrador Shelf were identified. Identification of probable end moraines and the ubiquitous distribution of coarse gravel and cobbles, as well as the excellent state of preservation of glacial landforms, strongly imply that the entire continental shelf was glaciated by the Laurentide ice sheet during the Wisconsinan. An initially cold-based ice sheet on the bank is strongly implied. Thus, deglaciation of the Labrador Shelf in the Hamilton Bank area may have been directly caused by a decreased resistance to spreading by decoupling the ice from the substrate. This occurred probably during a period of rising summer air temperatures which warmed the ice sheet and precipitated a change from cold to wet based glacial conditions. (Sims-ISWS)
W75-06279

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.

For primary bibliographic entry see Field 8G.
W75-06280

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-06315

2D. Evaporation and Transpiration

REGIMES OF STREAMFLOW AND THEIR MODIFICATION BY LOGGING,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05925

DIURNAL SOIL-WATER EVAPORATION: COMPARISON OF MEASURED AND CALCULATED SOIL-WATER FLUXES,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
R. D. Jackson, R. J. Reginato, B. A. Kimball, and F. S. Nakayama.
Soil Science Society of America Proceedings, Vol 38, No 6, p 861-866, November-December 1974. 8 fig, 2 tab, 20 ref.

Descriptors: *Evaporation, *Soil physics, Heat transfer, Soil water, *Soil water movement, Water transfer, *Diurnal distribution, Drying, Temperature, Measurement.
Identifiers: Isothermal theory, Philip and DeVries theory.

The Philip and DeVries theory and the 'isothermal' theory were used to predict diurnal soil water fluxes near the soil surface. The predicted values were compared with those obtained by measurements of soil-water content, soil temperature, and evaporation. Previously measured soil-water diffusivities were used in the theoretical calculations. The thermal vapor diffusivities were calculated using both the 'simple' and the 'complete' theory of Philip and DeVries. Comparison of measured and calculated fluxes indicated that the theory of Philip and DeVries predicts the measured values better at intermediate water contents, but the 'isothermal' theory predicts values better at high and very low water contents. (Roberts-ISWS)
W75-05963

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 3B.
W75-06095

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
For primary bibliographic entry see Field 3B.
W75-06121

METHOD FOR COMPUTING EVAPORATION FROM THE LAND SURFACE,
A. P. Vershinin.
Soviet Hydrology, Selected Papers No 6, p 484-495, 1972, 2 fig, 1 tab, 27 ref. Translated from Transactions of the State Hydrologic Institute (Trudy GGI), No 204, p 84-101, 1972.

Descriptors: *Evaporation, *Equations, Water balance, Heat budget, Mathematical models, Hydrologic budget, Soil moisture, Moisture content, *Methodology.
Identifiers: *Equations of motion, Global radiation.

Evaporation was described as one of the most important elements of the hydrologic and heat budgets of the active layer of the earth's surface. Yet the main patterns and mathematical models of evaporation were not sufficiently developed. Evaporation was classed with other elements of the hydrologic budget, such as the moisture content in the aeration zone and the vertical moisture exchange with groundwater. An attempt was made to represent a mathematical model of the interaction of these elements of the hydrologic budget as a single natural complex on the basis of several physical considerations and to express these elements in the form of working formulas. Several of the methods used to estimate evaporation were described; All were based on solving principal equations of motion and of water balance either in the soil or the atmosphere. All existing methods were divided into two groups, but the third way of describing evaporation processes, by using the main principles of the molecular-kinetic theory with thermodynamic principles, was not included. (Roberts-ISWS)
W75-06185

VAPORIZATION RESPONSE OF EVAPORATING DROPS WITH FINITE THERMAL CONDUCTIVITY,
Propulsion Sciences, Inc., Melville, N.Y.
V. D. Agosta, and S. S. Hammer.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA CR-2510, $4.25 in paper copy, $2.25 in microfiche. NASA Contractor Report 2510, January 1975. 58 p, 14 fig, 1 tab, 7 ref, append. Contract NAS 3-16761.

Descriptors: *Drops(Fluids), *Stability, Computer programs, Vapor pressure, Liquids, Thermal conductivity, Finite element analysis, Data processing, *Evaporation.
Identifiers: *Droplet vaporization, Rockets, Liquid oxygen.

A numerical computing procedure was developed for calculating vaporization histories of evaporating drops in a combustor where traveling transverse oscillations occurred. The liquid drop was assumed to have a finite thermal conductivity. The systems of equations was solved by using a finite difference method programmed for solution on a high speed digital computer. Oscillations in the ratio of vaporization of an array of repetitively injected drops in the combustor were obtained from summations of individual drop histories. A nonlinear in-phase frequency response factor for the entire vaporization process to oscillations in pressure were evaluated. In addition, a nonlinear out-of-phase response factor, in-phase and out-of-phase harmonic response factors, and a Princeton type n and tau were determined. The resulting data were correlated and presented in graphic form. Qualitative agreement with the open literature was obtained in the behavior of the in-phase response factor. Quantitatively, the results did not correlate with the results of a single drop model. (Roberts-ISWS)
W75-06215

EVAPORATION FROM SNOW COVER,
Finnish Hydrological Office, Helsinki.
R. Lemmela, and E. Kuusisto.
Hydrological Sciences Bulletin, Vol 19, No 4, p 541-548, December 1974. 5 fig, 3 tab, 6 ref.

Descriptors: *Evaporation, *Snow cover, Evaporation pans, Vapor pressure, Condensation, Snowmelt, Dew point, Weather patterns, Energy budget, Correlation analysis, Regression analysis.
Identifiers: *Finland, Snow surface.

The amount of evaporation from snow cover and its dependence on different climatic factors was discussed. The observations were made in an open experimental site in southern Finland between 1969 and 1973. The total period of observation was 107 days between February and April, before the melting period and after it commenced. The mean evaporation during the day (0700-1900 hours) was 0.26 mm, and during the night 0.03 mm. The correlation of the vapor pressure difference between snow surface and air with evaporation was high both during the day and night. On melting days, the magnitude of evaporation could be predicted quite accurately by means of the dew point temperature alone. The determination of the evaporation from the snow cover based on the energy balance was not presented. Only some preliminary studies had been made, and they were not promising. (Roberts-ISWS)
W75-06271

POTENTIAL EVAPORATION AS AN UNSTEADY PROCESS,
Waterloo Univ. (Ontario). Dept. of Civil Engineering.
G. Balachandran, T. E. Unny, and S. I. Solomon.
Journal of Hydrology, Vol 24, No 3/4, p 291-301, February 1975. 1 fig, 20 ref.

Descriptors: *Evaporation, Heat transfer, Mass transfer, Specific heat, Moisture uptake, Thermal expansion, Humidity, Numerical analysis.
Identifiers: *Potential evapotranspiration, Wet surface, *Potential evaporation rate.

The actual process of evaporation from a completely flooded field was analyzed in order to remove the various inconsistencies existing in the definition and interpretation of potential evaporation. The analysis led to the conclusion that potential evaporation should be considered as an unsteady process. The term potential evaporation was accordingly restated as potential evaporation rate. This term is applicable to a particular point in space and facilitates consideration of potential evaporation rate for small fields. Considering potential evaporation rate as an unsteady process makes it possible to deal with problems where evaporation from fields are related to climatic modifications and to changes in the soil medium. It is possible to calculate the total potential evaporation for periods as short as one hour, which would be useful to gage irrigation requirements. An analysis was given for an idealized situation. A numerical example was given to show a practical situation. (Roberts-ISWS)
W75-06290

INDEXES TO TRANSPIRATION BY FOREST TREES,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. Kochenderfer, and R. Lee.
Ecologia Plantarum, Vol 8, No 2, p 175-184, 1973. 2 fig, 2 tab, 12 ref.

Descriptors: *Transpiration, *Water loss, Measurement, Forests, *Trees, Coniferous trees, *Decidious trees, Phytometers, Stomata, Leaves.
Identifiers: *Black cherry.

Five indexes to transpiration rates of forest trees were tested for consistency among four deciduous species and one coniferous species. The phytometer, quick-weighing, leaf disc, water stress, and stomatal indexes were remarkably consistent among the species. Black cherry (Prunus serotina) transpired at the highest rate per unit area of leaf surface in all of the tests, at different times during the growing season, and under a variety of environmental conditions. The differences among the other species were less clearly defined. (Forest Service)
W75-06336

2E. Streamflow and Runoff

HYDROCHEMISTRY OF THE ATHABASCA AND NORTH SASKATCHEWAN RIVERS IN THE ROCKY MOUNTAINS OF CANADA,
McGill Univ., Montreal (Quebec). Dept. of Geography.
For primary bibliographic entry see Field 2K.
W75-05956

STATISTICAL ANALYSIS OF WATER TEMPERATURE RESIDUALS,
Missouri Univ., Rolla. Dept. of Computer Science.
B. E. Gillett, and L. L. Long.
Water Resources Research, Vol 10, No 6, p 1127-1132, December 1974. 9 fig, 5 ref.

Descriptors: *Water temperature, *Statistical models, *Mathematical studies, Temperature, *Regression analysis, *Fourier analysis, Water quality, *Missouri River, Model studies, Forecasting.
Identifiers: Water temperature residuals, Kolmogorov-Smirnov test.

Water temperature residuals, which are taken as the difference between the daily average water temperature (Missouri River, Boonville, Missouri) and the Fourier series regression fit to the data points, were analyzed. A 1-yr record length was used as a base period. The Kolmogorov-Smirnov test was used to determine, for a given number of extracted harmonics, the sample size required to yield a set of normal random variates with mean zero. With only the fundamental harmonic removed, a sample size of at least 180 is required to yield a sample average residual of less than 0.2F. When the fundamental and higher order harmonics were removed, this sample size was reduced considerably. (Jess-ISWS)
W75-05958

VARIATION OF MAINSTREAM LENGTH WITH BASIN AREA IN RIVER NETWORKS,
California Univ., Los Angeles. Dept. of Geology; and California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
R. L. Shreve.
Water Resources Research, Vol 10, No 6, p 1167-1177, December 1974. 12 fig, 2 tab, 33 ref. NSF Grant GA-18346.

Descriptors: Streams, *Drainage area, *Statistical models, *Monte Carlo method, *Kentucky, Drainage density, Hydraulics, *Channels, River basins, Networks, Variability.
Identifiers: *Channel sinuosity, Link lengths, Bivariate probability density, *Rockcastle Creek(Kent).

Mainstream length in river networks from various parts of the world varies statistically in proportion to basin area raised to a power that decreases from about 0.6 for small to medium basins (1 to 1000 sq km) to near 0.5 for the largest in the world (nearly 10,000,000 sq km). This relationship was predicted by the statistical theory of channel networks, which was founded on the basic postulates that (1) natural channel networks in the absence of strong geologic controls are very nearly topologically random and (2) interior and exterior link lengths and associated areas in basins with homogeneous climate and geology have separate statistical distributions that are approximately independent of location. The calculation was carried out by a Monte Carlo method. The necessary empirical data on link lengths and associated areas were obtained by measurement on maps of an 80-sq km basin (Middle Fork of Rockcastle Creek) in relatively flat-lying coal-bearing sandstones in eastern Kentucky. Agreement with observation was excellent for the small to medium basins, but the ratio of predicted to observed mainstream length progressively decreases to about 0.7 for the largest basins. This discrepancy was accounted for by moderate downstream increase in channel sinuosity and decrease in drainage density. (Bhowmik-ISWS)
W75-05960

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
For primary bibliographic entry see Field 2J.
W75-05961

CURRENT OBSERVATIONS FROM THE WESTERN MEDITERRANEAN DURING COBLAMED 69,
Naval Underwater Systems Center, Newport, R.I.
D. H. Shonting.
Limnology and Oceanography, Vol 10, No 5, p 866-874, September 1974. 9 fig, 3 tab, 12 ref.

Descriptors: *Ocean currents, *Ocean circulation, *Buoys, *Drifting(Aquatic), Ocean waves, Littoral drift, Oceanography, Sea breezes, Movement, Water circulation, Waves(Water).
Identifiers: *Mediterranean Sea, Surface motion, Vector diagrams, Kinetic energy.

Current in the upper 60 m in the western Mediterranean displayed dominant inertial character strongly modulated by wind changes, which also altered the mean flow. Kinetic energy variations associated with the current at 60 m corresponded with gross changes in wind and sea state and were equivalent to observed kinetic energy changes associated with coastal tides. Current records from a slowly drifting buoy were similar to fixed buoy records. Kinetic energy spectra indicated a -5/3 power frequency dependence. Spectral coherence was high for both vertical and horizontal separation, with the vertical motions strongly out of phase and the horizontal strongly in phase. (Sanderson-ISWS)
W75-05962

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
For primary bibliographic entry see Field 5A.
W75-05970

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
For primary bibliographic entry see Field 4A.
W75-05976

COMPUTING FLOOD FREQUENCY IN THE HUMID EASTERN USA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05981

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05982

A GENERAL FORMULA FOR DETERMINATION OF PEAK FLOOD,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05983

FLOOD COMPUTATIONS FOR THE HAWAIIAN ISLANDS,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05984

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 4A.
W75-05986

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
T. Thammongkol.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 195-209. (1973) 5 fig, 3 tab, 9 ref.

Descriptors: *Peak discharge, *Floods, *Evaluation, Flow rates, Flood peak, Flood discharge, Model studies, Computer models, Analysis, Analytical techniques, Rivers.
Identifiers: *Mekong River, Thailand(Vientiane).

Results were presented of an evaluation of the 1966 peak discharge, the highest flood on record, of the Mekong at Vientiane. Stage height was 12.71 m (170.75 m MSL). Five approaches used to determine the peak discharge were: extension of rating curve, extension by studies of area and velocity, extension of discharge as a function of area times the square root of hydraulic radius, Manning formula, and the mathematical simulation of streamflow for the Luang Prabang-Vientiane reach. In the first four methods, stations at KM 1601 (Pa Mong damsite) and Ban Pha Tang, where the flood flow was confined in the river channel, were used as index stations. These two stations are, respectively, 19 and 25 km upstream from Vientiane. In the fifth method, the desired flow at Vientiane was considered to be composed of two parts: (1) the routed flow from Luang Prabang, the next upstream station; and (2) the intervening flow between Luang Prabang and Vientiane, which was computed from the Streamflow Synthesis and Reservoir Regulation (SSARR) watershed model incorporated with the rainfall data. From the first four methods, the peak discharges at KM 1601 was computed to be 25,000 and at Ban Pha Tang, 26,000 cu m/s. From judging the conditions of the river channel and flow at Luang Prabang as well as the quality of data, the peak discharge of 26,000 cu m/s was adopted. The computed peak discharge from streamflow simulation by SSARR model confirmed the results of 26,000 cu m/s derived from the first four methods. (See also W75-05973) (Humphreys-ISWS)
W75-05987

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05988

FLOOD PREDICTION - A BAYESIAN APPROACH,
West Virginia Inst. of Tech., Montgomery. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05989

SOME ASPECTS FOR THE SELECTION OF AN ADEQUATE PROBABILITY DISTRIBUTION FUNCTION FOR FLOOD ANALYSIS,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 4A.
W75-05990

UNIT HYDROGRAPHS AND STATISTICAL DENSITY FUNCTIONS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
G. N. Alexander.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 241-252 (1973). 5 fig, 24 ref.

Descriptors: *Hydrograph analysis, *Unit hydrographs, *Statistical methods, Hydrographs, Hydrology, Stochastic processes, Probability, Base flow, Rainfall-runoff relationships, Runoff, Rainfall, Parametric hydrology, Hydrologic aspects.
Identifiers: Statistical density functions, Gamma distribution, Deterministic hydrology.

Visual inspection shows that there is often a good resemblance between the shape of a flood hydrograph and the density function of a statistical distribution having time or duration as its variable. Assuming a Gamma distribution, this concept has been previously used in estimating runoff from rainfall and also in the deterministic procedure of flood routing. Statistical parameters such as 'location,' 'scale,' and 'shape' of pertinent distributions were considered. Shape was defined by a pair of moment-ratios, the theoretical distributions being represented by a point or line on a moment-ratio diagram, thus enabling comparison with observed values of shape. Observed hydrographs were compared with the Gamma and Weibull distributions on probability paper. The results indicate that there is considerable scope for the application of recognized statistical techniques in describing unit hydrographs, although there is insufficient evidence to discriminate between possible distribution types. (See also W75-05973) (Humphreys-ISWS)
W75-05991

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
For primary bibliographic entry see Field 2A.
W75-05993

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 4A.
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05995

A STUDY OF THE PERAK RIVER FLOOD OF JANUARY 1967 AND AN EVALUATION OF THE FLOOD CONTROL ASPECTS OF TEMENGOR RESERVOIR,
Shawinigan Engineering Co. Ltd., Montreal (Quebec).
P. A. Banks, and T. Y. Huat.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 341-352. (1973) 5 fig, 1 ref.

Descriptors: *Flood control, *Flood damage, *Project planning, Regional flood, Design flood, Multiple purpose projects, Hydrology, Hydrographs, River regulation, River basin development, Floods, Damages, Frequency, Feasibility studies, Cost-benefit analysis, Reservoirs.
Identifiers: *Malaysia(Temengor reservoir), Perak River.

Following a feasibility study for power development on the Perak River, a large storm over northern West Malaysia produced a major flood causing considerable damage in the whole valley. The National Electricity Board of the States of Malaya initiated a study of the flood and evaluated the cost of the damage caused directly by flooding. A damage-frequency relationship which enabled the flood control benefits to be evaluated was established before and after the completion of the proposed dam. The spillway facilities proposed in the power scheme were modified to provide a greater measure of flood control, and the cost of this modification was related to the resulting benefits. The technical feasibility and economic benefit of providing flood control facilities in the development of the Temengor site for the production of power was demonstrated. Development of the power shceme incorporating these flood control features is now proceeding. (See also W75-05973) (Humphreys-ISWS)
W75-05999

NORMS AND CRITERIA FOR INITIATING SCIENTIFIC ASSESSMENT OF FLOOD DAMAGES IN NON-UNIFORM CONDITIONS IN MADHYA PRADESH STATE--INDIA,
Madhya Pradesh Government, Control Board for Major Projects, Bhopal (India).
D. R. Sikka.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 353-358. (1973).

Descriptors: *Flood damage, *Floods, Agriculture, Damages, Estimating, Evaluation, Land management, Cultivated lands.
Identifiers: India.

It was suggested that velocity records, area slope charts, and soil and land classification tables for the area subject to floods or required to be conserved for cultivation should be determined for ascertainment of damages to crops due to loss of soil. It is a tremendous task involving considerable survey and funds. The real 'flood loss' in both cases, for initiation of effective plans for protection of limited useful agricultural lands, is necessary not only for the present needs but for those of future generations. Adequate interest, funding, and legislated measures are essential for recognition of this concept for regulation of floods and their effects in such areas in the developing countries which visually may not look very severe. (See also W75-05973) (Humphreys-ISWS)
W75-06000

FLOOD ROUTING STUDIES OF GANDHISAGAR DAM,
Madhya Pradesh Irrigation Dept., Bhopal (India).
D. S. Sinha.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 385-396. (1973) fig.

Descriptors: *Flood routing, *Hydrologic aspects, *Hydrographs, Floods, Rivers, Flood control, Reservoirs, Design flood, Rainfall, Precipitation(Atmospheric), Meteorology, Reservoir operation, Regulation.
Identifiers: *India(Gandhisagar dam).

The Gandhisagar dam across the Chambal River was built with a spillway capacity of 450,000 cfs. The design flood was 750,000 cfs. Soon after construction, floods of over 750,000 cfs impinged on the reservoir. Based on hydrometeorological studies, the standard project flood was found to have a peak of 1,172,000 cfs. This meant that a big flood reserve would have to be maintained during the monsoon months and there would be corresponding reduction in the useful capacity of the reservoir. As the time travel of flood to the dam is very short, it was found that flood warning would also have limited use. The alternative of allowing occasional submersion of land and property above the present maximum water level is under governmental examination for making maximum use of available capacity. (See also W75-05973) (Humphreys-ISWS)
W75-06003

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06005

FORECASTING FLOOD HYDROGRAPHS ON THE DANUBE USING THE PASSAGE THEORY,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W75-06006

BASINWIDE FLOOD FORECASTING SYSTEM FOR THE LOWER MEKONG BASIN,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 4A.
W75-06007

FORECASTING OF FLOOD CHARACTERISTICS OF THE NILE,
Technical Univ. of Budapest (Hungary).
For primary bibliographic entry see Field 4A.
W75-06008

EFFICIENT GATE OPERATION OF THE VAALDAM TO MINIMIZE DOWNSTREAM FLOOD DAMAGE,
Department of Water Affairs, Pretoria (South Africa).
For primary bibliographic entry see Field 4A.
W75-06009

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
G. K. Young, M. Chi, R. U. Jettmar, G. F. Tierney, and E. Neal.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 864, $5.25 in paper copy, $2.25 in microfiche. Completion Report, January 15, 1975. 97 p, 19 fig, 3 tab, 61 ref. OWRT C-3029(3730)(1). 14-31-001-3730.

Descriptors: Water resources, *Planning, *Runoff, Reservoirs, Economics, Droughts, Water supply, Analytical techniques, Hydrology, *Probability, Streamflow, *Estimating, Risks, *Synthetic hydrology, Stochastic processes, Markov processes, Decision making, *Model studies.

The objective is to determine the consequences of using simple or complex monthly streamflow synthetic data generators on economic decision making from the standpoint of reservoir design as well as regulation. The research method uses Monte Carlo experimentation. Two data generators are tested: a Markov model and a complex self-similar model. Typical economic loss functions are employed (flood, water supply and recreation) to find optimal sizes and methods of regulation. Complex data generators show higher design variances, but in expectations both synthetic generators give designs similar to the historic record. It also appears that operating rules are insensitive to choice of generating models.
W75-06070

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
For primary bibliographic entry see Field 5B.
W75-06081

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
J. P. Jolly, and V. Yevjevich.
Journal of Hydraulic Research, Vol 12, No 3, p 315-335, 1974. 9 fig, 10 ref.

Descriptors: *Waves(Water), *Non-uniform flow, *Celerity, Flow, *Chezy equation, Stability, Momentum equation, Mathematics, Stage-discharge relations, Channels, Froude number, Numerical analysis, Equations, Hydraulics, Simulation analysis.
Identifiers: *Flow stability, *Vedernikov number, Method of characteristics.

A flood wave attenuates as it travels along a natural or artificially constructed channel. When the Froude number is above a certain value, the flow depth may increase downstream, such as in a tailrace structure of a powerhouse and in a canal with steep bed slope. The increase in flow depth defines the instability in open channel flow and is normally referred to as the passage of gradually varied waves to slug flow. With gradually varying flow the governing equations are two-dimensional, the equations of conservation of mass and conservation of linear momentum. These equations were integrated by the method of characteristics with the Chezy resistance law. The results of the simulations of supercritical flow resulting from single-peaked waves by integrating the governing equations were designated as numerical experiments. In these experiments both sinusoidal and asymmetric shaped waves were introduced. The base and shape of the inflow hydrograph as well as the stage-discharge relation affected the rates of amplification or attenuation that occur along a channel. The significance of the Vedernikov number was stressed in determining whether roll waves will form with uniform, steady flow and whether gradually varied, single-peaked waves will amplify. (Singh-ISWS)
W75-06118

AN IMPLICIT METHOD TO SOLVE SAINT VENANT EQUATIONS,
Centro di Ricerca IBM di Pisa (Italy).
F. Greco, and L. Panattoni.
Journal of Hydrology, Vol 24, No 1/2, p 171-185, January 1975. 5 fig, 2 tab, 9 ref.

Descriptors: *Momentum equation, *Continuity equation, *Numerical analysis, *River flow, *Water levels, Analytical techniques, Methodology, Streamflow, Routing, Hydrographs, Equations.
Identifiers: *Italy(Arno River), Implicit numerical method, Convergence speed.

The Saint Venant equations constitute a system of two nonlinear partial differential equations that cannot be solved analytically except in very special cases. An implicit numerical method for solving these equations was presented and applied to the river Arno in Italy. This method exploits the linearity in the discharge of the mass equation and expresses the discharge as a function of the water level in the equation of motion. The resulting nonlinear equation for a grid element contains only the water levels as unknown quantities. The solution of the system of equations for the entire reach, by the use of the Newton iteration method, was facilitated by the particular form of the matrix of the coefficients. The rapid rate of convergence and the limited storage allocation were characteristics of this implicit scheme. This method was compared with other implicit methods based on the same grid of points. (Singh-ISWS)
W75-06119

A GENERAL THEORY FOR FLOW IN ROUGH CONDUITS,
Washington State Univ., Pullman. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-06120

A SIMPLE PROCEDURE FOR SYNTHESIZING DIRECT RUNOFF HYDROGRAPHS,
University of the Witwatersrand, Johannesburg (South Africa).
For primary bibliographic entry see Field 2A.
W75-06123

ON FORCED OSCILLATIONS IN A ROTATING STRATIFIED FLUID,
East Carolina Univ., Greenville, N.C. Dept. of Mathematics.
For primary bibliographic entry see Field 8B.
W75-06124

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06127

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
D. B. Spalding.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32787, $3.75 in paper copy, $2.25 in microfiche. January 1974. 35 p, 4 fig, 34 ref.

Descriptors: *River flow, *Model studies, *Heat budget, *Chemical analysis, *Dissolved oxygen, Analytical techniques, Environmental effects, Hydrodynamics, Water circulation, Turbulence, Computers, Rivers, Topography, *Mathematical models.
Identifiers: Curved boundaries.

A new calculation procedure was applied to the mathematical modeling of rivers. The procedure solves the governing differential equations numerically, and so predicts the three-dimensional distributions of water velocity (three components), temperature, turbulence energy and scale, oxygen content, and other practically-interesting variables. Because a 'marching-integration' technique is used, only two-dimensional computer storage is needed, even though the flow process is three-dimensional. Special features of the computer program incorporating the method are: a stretching grid, which accommodates itself to changing width and depth of the river along its length; and a curved boundary treatment, allowing changes in bed profile to be incorporated. (Singh-ISWS)
W75-06132

SURFACE RUNOFF HYDROGRAPH EQUATION,
Nevada Univ., Reno. Center for Water Resources Research.
For primary bibliographic entry see Field 2A.
W75-06139

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-06186

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06201

A METHOD OF IMPROVING THE UNIFORMITY OF THE STREAM IN AN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
A. M. Binnie, and B. M. Sumer.
Journal of Hydraulic Research, Vol 12, No 3, p 299-313, 1974. 12 fig, 1 tab, 11 ref, 1 append.

Descriptors: *Hydraulics, *Channels, *Froude number, *Laboratory tests, *Waves(Water), Free surfaces, Roughness(Hydraulic), Momentum transfer, Profiles, Model studies, Streams.
Identifiers: *Sinusoidal waves, Kelvin waves, Self-induced waves.

Circulating water-channels with a free surface in the inlet contraction and the working section have a restricted range of operation. Above a stream Froude number, F, of about 0.5, self-induced stationary waves appear with their crests at right angles to the stream, and their amplitude increases sharply with increase of F. Described were attempts in small-scale apparatus to destroy these unwanted waves by means of another wave train caused by a ridge on the contraction bottom. Both types of wave were found to be shorter than sinusoidal waves and to depend on some other factor than F alone, therefore the tests had to proceed empirically. However, considerable improvements were possible. For example, a stream at F = 0.795 with a ridge in place was nearly as flat as one of the same depth at F = 0.49 with no ridge. Most of the trials were in a channel with slotted sides and bottom, but a few were made in a solid-walled channel. (Singh-ISWS)
W75-06207

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
For primary bibliographic entry see Field 8B.
W75-06212

TR-20 PROJECT FORMULATION--HYDROLOGY, COMPUTER PROGRAM USER'S MANUAL,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06219

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06220

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06221

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06242

SEDIMENT INERTIA AS CAUSE OF RIVER ANTIDUNES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
For primary bibliographic entry see Field 2J.
W75-06256

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
For primary bibliographic entry see Field 5A.
W75-06264

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2A.
W75-06269

2F. Groundwater

METHOD FOR TRACING THE FLOW OF WATER IN SUBTERRANEAN FORMATIONS,
Union Oil Co. of California, Los Angeles. (assignee)
B. B. Saniford, and R. K. Knight.
U.S. Patent No 3,851,171, 5 p, 1 fig, 1 tab, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1797, November 26, 1974.

Descriptors: *Patents, *Ground water movement, *Tracers, *Water resources, *Water flow, *Subsurface waters, Movement, Reservoirs, Oil reservoirs.
Identifiers: *Chemical tracers, Poly(Hydroxyalkyl), Bis(Triazinylamino) stilbene, Subterranean formations.

A method is disclosed for tracing the flow of water through a subterranean formation. A water-soluble substituted poly(hydroxyalkyl) bis(triazinylamino) stilbene is added to the water at a selected point and samples of water are withdrawn from the formation at one or more points remote from the point of addition and analyzed for the presence of this agent. (Sinha-OEIS)
W75-05884

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05932

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
For primary bibliographic entry see Field 5B.
W75-06015

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
R. L. Cooley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 813, $5.75 in paper copy, $2.25 in microfiche. Technical Report Series H-W, Hydrology and Water Resources Publication No. 18, January 1974. 134 p, 30 fig, 7 tab, 33 ref, 3 append. $5.00. OWRT A-048-NEV(1). 14-31-0001-3828.

Descriptors: *Groundwater movement, Saturated flow, Unsteady flow, Computer models, Numerical analysis, *Computer programs, *Finite element analysis, *Equations, Confined water, Flow measurement.

Theory and background as well as details for practical usage of computer programs for modeling ground-water flow are presented. Areal equations for confined and unconfined ground-water flow were developed by integration of three-dimensional flow equations over the vertical. Results show that all areal equations are best written in terms of mean head in the vertical. Discretization of the equations was accomplished through use of a finite difference-numerical integration method and a finite element technique. The two equivalent approaches incorporate continuous or discontinuous variable hydraulic parameters. Vertical cross sections and radial flow problems may be treated simply by parameter redefinition which is accomplished automatically in computer programs. Approximate analysis of convergence and stability of matrix equations resulting from discretization of the flow equations, indicates that all time discretization schemes are stable. However, oscillations can develop for large time steps for all schemes except the fully implicit type. Three basic computer programs incorporating the four solutions are described in detail, complete with card input instructions, and listings are given. These programs were written with emphasis on generality combined with minimization of input and ease of modification. Consequently, parameters are input on a zone by zone basis. Also, program modifications to handle a water-table aquitard and unconfined flow are described.
W75-06083

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
L. W. Gelhar.
Water Resources Research, Vol 10, No 3, p 539-545, June 1974. 6 fig, 1 tab, 19 ref. OWRT C-4119(No 9022)(1).

Descriptors: *Stochastic processes, *Dupuit-Forchheimer theory, *Groundwater recharge, Aquifers, Groundwater movement, Hydrology, Reservoirs, Analytical techniques, Anistrophy, Streams, Groundwater, Evaluation, Laplaces equation, Mathematical studies, Equations, Surface-groundwater relationships.
Identifiers: *Phreatic aquifers, Linear reservoir model, Lumped parameter, Dupuit aquifer model, Laplace aquifer model, Spectral density function, Variable recharge, Partially penetrating streams.

Three analytical models were developed to describe the spectral response characteristics of phreatic aquifers subject to time variable accretion and fluctuations in adjacent stream stage. A linear reservoir model will approximate the behavior of a more complete distributed linear model based on the Dupuit approximation if a single parameter is adjusted appropriately. A linearized two-dimensional analysis including the effects of vertical flow showed, under conditions of large anisotropy with relatively narrow partially penetrating streams, differences from the Dupuit analysis that may be important under some field conditions. Possible applications of the results in aquifer evaluation were suggested. (Visocky-ISWS)
W75-06138

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
Y. H. Huang, and S. L. Sonnenfeld.
Water Resources Research, Vol 10, No 3, p 591-596, June 1974. 4 fig, 9 ref. OWRT A-042-KY(4).

Descriptors: *Artesian aquifers, Groundwater, *Confined water, *Finite element analysis, *Mathematical models, *Computer models, *Unsteady flow, Equations, Model studies, Digital computers, Wells, Aquifers, Groundwater potential, *Groundwater movement, Subsurface flow, Computer programs, Drawdown, Mathematics.
Identifiers: Three-dimensional flow, Cylindrical elements, Variational calculus, Functionals, Radial symmetry.

A numerical method based on three-dimensional finite elements was presented for determining the unsteady drawdown around an artesian well. The uniqueness of the method lies in the use of cylindrical elements, the stiffness matrix of which can be easily derived. The method was programed for a high-speed computer, and the capability of the computer program was described. A comparison between the finite element and the exact analytical solutions for some simple cases indicated that the use of cylindrical elements gave accurate results. An example was given to illustrate the application of the method to non-homogeneous and asymmetric aquifers where the hydrogeologic boundaries could be approximated by the cylindrical elements. (Prickett-ISWS)
W75-06140

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W75-06238

IN-SITU PERMEABILITY ANALYSIS USING BAROMETRIC PRESSURE FLUCTUATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
A. E. Sherwood.
Report No. UCRL-51687, November 4, 1974. 18 p, 9 fig, 1 tab, 25 ref, append. AEC Contract W-7405-Eng-48.

Descriptors: *Permeability, *Atmospheric pressure, *Porous media, *Fourier analysis, Numerical analysis, Rock properties, Pressure, Computer

programs, Diffusivity, Hydrologic properties, Equations, Airswater interfaces, Transmission lines.
Identifiers: *In-situ permeability, *Pressure wave propagation, *Air saturated porous media.

Methods of inferring in-situ permeability from measurements of barometric pressure fluctuations were reviewed. The technique was used in air-saturated porous media at the Nevada Test Site. The two principal methods of analysis involve decomposition of pressure fluctuations into a train of sequential rectangular pulses and a Fourier series of sine waves. The equations for pressure wave propagation were shown to be identical in form to those for signal propagation on an electric transmission line. The transmission line theory offers a powerful method for following the pressure wave in a dissipative porous medium. Transmission line methods were used to investigate reflections from the end of a finite path, leakage to the surroundings from permeable side walls, and the signal perturbations introduced by a sampling probe. A computer program was developed to evaluate the response in radial flow to a step change in pressure. A comparison between pressure waves in radial and linear flow indicated that there are sufficient differences in attenuation and phase lag to permit discrimination between these geometric models. (Sanderson-ISWS)
W75-06241

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
For primary bibliographic entry see Field 4B.
W75-06258

THE PERMEABILITY AND STORAGE OF AN UNCONFINED CHALK AQUIFER,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
S. S. D. Foster, and V. A. Milton.
Hydrological Sciences Bulletin, Vol 19, No 4, p 485-500, December 1974. 9 fig, 18 ref.

Descriptors: *Carbonate rocks, *Water table aquifers, *Permeability, *Storage coefficient, Saturated flow, Watersheds(Basins), Groundwater, Base flow, Hydrogeology, Geologic control, Limestones, Fissures(Geologic), Resistivity, Test wells, Aquifer testing, Pumping, Graphical analysis, Aquifer characteristics, Unsteady flow, Springs, Discharge(Water).
Identifiers: *Chalk aquifer(England), *Fissure storage.

In its saturated zone the Chalk, the most important British aquifer, is a dominantly fissure-flow and essentially fissure-storage formation. The results of a comprehensive investigation into its hydraulic behavior in an area of some 40 sq km of the East Yorkshire outcrop were evaluated. The hydraulics of idealized fissures were used to extend the interpretation. No strong lateral anisotropy of hydraulic properties is apparent in this area but vertical heterogeneity is very marked, with the main permeability development probably being along horizontal discontinuities in two layers of restricted thickness. (Visocky-ISWS)
W75-06274

VERTICAL PERMEABILITY FROM LIMITED ENTRY FLOW TESTS IN THICK FORMATIONS,
Amoco Production Co., Tulsa, Okla.
For primary bibliographic entry see Field 4B.
W75-06282

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 8B.
W75-06283

NON-EQUILIBRIUM THERMODYNAMICS OF THERMO-OSMOSIS OF WATER THROUGH KAOLINITE,
Harcourt Butler Technological Inst., Kanpur (India). Dept. of Chemistry.
R. C. Srivastava, and P. K. Avasthi.
Journal of Hydrology, Vol 24, No 1/2, p 111-120, January 1975. 6 fig, 3 tab, 17 ref.

Descriptors: *Thermodynamics, *Heat flow, *Osmotic pressure, *Kaolinite, Flow, Permeability, Porous media, Entropy, Model studies, Darcys law, Viscosity, Activation energy, Thermal conductivity, Thermocline.
Identifiers: *Thermo-osmosis, Phenomenological coefficients, Pressure gradient, Transport heat, Vaporization heat.

An experiment on thermo-osmosis of water through kaolinite was reported and the data were analyzed in the light of irreversible thermodynamics. The values of phenomenological coefficients were estimated. Contrary to the expectations, the values of heat of transport of water as calculated from the thermo-osmotic pressure data were found to be extremely low in comparison to the activation energy for flow process. (Visocky-ISWS)
W75-06284

ON THE HYDROLOGY OF THE EDWARDS LIMESTONE, SOUTH CENTRAL TEXAS,
California State Univ., San Diego. Dept. of Geological Sciences.
P. L. Abbott.
Journal of Hydrology, Vol 24, No 3/4, p 251-269, February 1975. 10 fig, 1 tab, 22 ref.

Descriptors: *Areal hydrogeology, *Hydrogeology, *Geohydrologic units, *Groundwater movement. *Carbonate rocks, *Karst hydrology, Limestones, Dolomite, Aquifers, Vadose water, Circulation, Porosity, Water resources, Meteoric water, Seepage, Permeability, *Texas, Beds(Stratigraphic), Geologic history, Structural geology, Geologic formations, Faults(Geologic).
Identifiers: Carbonate hydrology, *Lithology, Cavernous aquifer, Limestone terrane.

The Edwards Limestone (Albian) is a mosaic of shallow water, back-reef, carbonate lithofacies averaging about 150 m thick, that have been dolomitized, chertified, and calcitized. Intermittent subaerial exposure during and shortly after deposition of the Edwards resulted in solution-enlargement of some primary voids. Slow upwarping of the northwestern margin of the subsiding ancestral Gulf of Mexico basin elevated the Edwards Group above sea level late in the Cretaceous. Down-to-the-coast, en echelon, normal faulting along the Balcones system during the Early Miocene accentuated the topographic position of the Edwards above sea level. Rejuvenated Gulfward flowing streams cut into the up-thrown fault block and exposed the uppermost Edwards Limestone in the bottoms of deep canyons, which created the discharge sites that initiated a continuously circulating groundwater system within the Edwards Limestone in the Miocene. The early porosity systems have increased in volume through the self-ramifying cavern solution process that occurs in carbonate rocks. The down-dip boundary of the aquifer, or 'bad-water line,' represents an early bypass boundary of the aquifer that has become deeply ingrained with time. Cavern development is largely sub-horizontal and reflects the control of bedding partings and beds of differing lithology. The Edwards Limestone aquifer has only a few widely separated natural discharge sites which, when viewed in scale, make the confined aquifer appear like a regional master conduit. This cavernous system is known as the Edwards underground reservoir and it supplies the water for most of south-central Texas. (Sanderson-ISWS)
W75-06287

FLOW IN A VERTICAL POROUS COLUMN DRAINED AT ITS BOTTOM AT CONSTANT FLUX,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
U. Kroszynski.
Journal of Hydrology, Vol 24, No 1/2, p 135-153, January 1975. 11 fig, 23 ref, 3 append. USDA Grant FG-IS-287.

Descriptors: *Model studies, *Aquifers, Groundwater, *Groundwater movement, *Porosity, Numerical analysis, Analytical techniques, Retention, Hydraulic conductivity, Moisture content, Head loss, Theis equation, Soil water, Finite element analysis.
Identifiers: *Vertical porous columns, Effective porosity, *Drainable porosity, Delayed yield, Vertical flow, Elastic storage, Moisture profiles.

A soil column, saturated at its lower portion and initially in condition of hydrostatical equilibrium was drained at a constant flux at its bottom. Due to the presence of the unsaturated zone above the water table, the motion of the saturation surface depended in a complex manner on time and on soil properties. After defining a characteristic length, the equation of unsaturated flow was solved numerically by a finite difference scheme for different values of drained flux, for two similar soils. Although moisture and head profiles were different for both soils, drawdown curves were found to be in good agreement during a certain time interval which depended on the value of the drained flux. The same problem was solved analytically by a linearization procedure. A simple expression which predicted saturation surface drawdowns quite accurately for small values of the drained flux and for moderate time intervals was derived. An effective porosity coefficient was defined and its variation with time was represented. The bearing of the results on flow in unconfined aquifers was discussed. (Schicht-ISWS)
W75-06295

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W75-06296

2G. Water In Soils

EFFECT OF RATE AND DATE OF SEEDING SHOSHONI WINTER WHEAT ON SOIL MOISTURE DEPLETION,
Arizona Crop Improvement Association, Inc., Tucson.
B. J. Kolp, R. G. Sackett, K. E. Bohnenblust, and G. P. Roehrkasse.
Agron J. Vol 65, No 6, p 929-930, 1973.

Descriptors: *Wheat, *Soil moisture, Soil-water-plant relationships.

The extent to which high rates and early planting of winter wheat (Triticum aestivum L.) depleted soil moisture was determined. 'Shoshoni' winter wheat was implanted at seeding rates of 17, 34, 50 and 67 kg/ha on 4 seeding dates, Aug. 19, Aug. 26, Sept. 4, and Sept. 11, 1965. In mid-Aug., Nov., April, and after harvest soil moisture was measured to a depth of 122 cm using the neutron

probe. Moisture depletion during the fall, winter, and spring growing periods was calculated. During stand establishment, the wheat planted Aug. 19 depleted soil moisture significantly more than wheat planted Sept. 4 and 11, and the wheat seeded at the rates of 34, 50 and 67 kg/ha depleted soil moisture significantly more than that at the 17 kg/ha rate. Kernel protein content of wheat harvested for planting dates Aug. 19, Aug. 26, Sept. 4 and Sept. 11 was 12.2, 13.3, 13.2, and 14.2% respectively. There were no significant differences in grain yield attributed to planting dates or rates. During the test period adequate spring moisture was received. During years of low spring precipitation, conservation of moisture by planting on the recommended date or later could be important.--Copyright 1974, Biological Abstracts, Inc.
W75-05854

THE HYDROLOGIC CHARACTERISTICS OF UNDRAINED ORGANIC SOILS IN THE LAKE STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter.
In: Histosols: Their Characteristics, Use and Classification, Soil Science Society America, Madison, Wisconsin, Special Publ. 6, Chpt. 4, p 33-46, 1974. 8 fig, 3 tab, 25 ref.

Descriptors: *Peat, *Organic soils, *Streamflow, *Soil physical properties, Hydrologic properties, Bogs, Runoff, Minnesota, Swamps, Groundwater, Water table, Forestry, Soil water, Michigan, Wisconsin.
Identifiers: Fiber content, Histosols, Wetland hydrology, Degree of decomposition, Peatlands.

Although the capacity of peat materials to take up and hold water has been recognized for many years, only recently have studies evaluated the physical and hydrologic characteristics of peat materials in their natural undrained profile. Water retention and hydraulic conductivity were found to vary greatly for different peat materials depending on their degree of decomposition. Although peatlands have sometimes been considered regulators of streamflow, the high water retention values and low hydraulic conductivities of moderately to well decomposed peat show that they give up too little water too slowly to maintain streamflow. Two-thirds of the annual streamflow from perched lake-filled bogs occurs prior to June 1 and they do not make any substantial contribution to streamflow during dry periods. The flat topography and high adsorption capacity of the peat materials result in temporary short-term storage which reduces storm flow runoff peaks, particularly after summer drying periods when bog water tables are low. (Forest Service)
W75-05924

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2I.
W75-05933

DIFFICULT ERODED PLANTING SITES IN NORTH MISSISSIPPI EVALUATED BY DISCRIMINANT ANALYSIS,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05938

DIURNAL SOIL-WATER EVAPORATION: COMPARISON OF MEASURED AND CALCULATED SOIL-WATER FLUXES,
Agricultural Research Service, Phoenix, Ariz. Water Conservation Lab.
For primary bibliographic entry see Field 2D.
W75-05963

INFLUENCES OF MULCH RATE AND SLOPE STEEPNESS ON INTERRILL EROSION,
Instituto Nacional de Tecnologia Agropecuaria, Marcos Juarez (Argentina). Estacion Experimental Agropecuaria.
For primary bibliographic entry see Field 2J.
W75-05964

DETERMINATION OF WETTING FRONT SUCTION IN THE GREEN-AMPT EQUATION,
Monash Univ., Clayton (Australia). Dept. of Civil Engineering.
R. G. Mein, and D. A. Farrell.
Soil Science Society of America Proceedings, Vol 38, No 6, p 872-876, November-December 1974. 3 fig, 4 tab, 10 ref.

Descriptors: *Infiltration, *Unsaturated flow, *Soil moisture, *Wetting, *Equations, Mathematics, Mathematical studies, Capillary conductivity, Natural recharge, Percolation, Moisture, Approximation method, Soil analysis, Soil profiles, Soil water, Pore pressure.
Identifiers: *Wetting fronts, *Green-Ampt equation, Moisture fronts, Capillary suction.

Interest in the Green-Ampt equation to predict infiltration rates into uniform and layered soils has increased in recent years. The work reported was a study of the theoretical justification of determining the suction (at the wetting front) parameter in the equation from the hydraulic conductivity versus capillary suction relationship for the soil. The wetting front suction so determined and used in a form of the Green-Ampt equation which allows for the surface boundary condition initially being one of constant flux gives predictions of infiltration volumes comparable to those determined by numerical solution of the complex partial-differential equation of moisture flow. (Prickett-ISWS)
W75-05965

THE CLIMATIC ADAPTATION OF POPULATIONS OF COCKSFOOT (DACTYLIS GLOMERATA L.) FROM SOUTHERN FRANCE,
Waite Agricultural Research Inst., Glen Osmond (Australia).
R. Knight.
J Appl Ecol, Vol 10, No 1, p 1-12. 1973, Illus.

Descriptors: *Plant populations, Mediterranean, Drought, Adaptation, Ecotypes.
Identifiers: Cocksfoot, Dactylis glomerata.

Populations of D. glomerata were sampled along 2 transects in southern France both of which began near the Mediterranean coast, one going to 80 km north to the Massif Central, the other 450 km west to the Atlantic seaboard. These populations and a group of ecotypes and cultivars were grown in the Mediterranean-type climate of Adelaide, Australia. Seasonal yields, summer survival, heading dates and head numbers were assessed over 2 yr. These assessments were related to the climatic conditions prevailing at the respective collecting sites. The ombrothermic relation was used to provide an estimate of summer drought. There was variation in seedling vigor with populations from dry Mediterranean environments in particular, lacking vigor. At the first harvest there was more than a 20-fold variation in yield. Both transects covered the range from summer-dormant to summer-growing populations a variation that was related to the duration of the drought period and not to annual rainfall. The ability of a population to survive the summer was inversely correlated with its summer growth. Winter dormancy was detected only in high-altitude populations from the Massif Central. Although a wide variation in heading dates was obtained it could not be related to position in the transect and macroclimatic factors, but must have been due to microclimatic or biotic factors. Populations from near the Mediterranean produced the greatest number of heads. Seed retention was highest in populations that were summer-dormant, and these produced many naked seeds when threshed, whereas the summer-growing populations, readily shed seed when ripe, the seed being enclosed by glumes.--Copyright 1974, Biological Abstracts, Inc.
W75-06098

THE INFLUENCE OF ARTIFICIAL RAINFALL AND DI-1-P-MENTHENE ON KARBUTILATE MOVEMENT IN GREENHOUSE SOIL,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5B.
W75-06214

A STUDY OF SOIL MATRIC POTENTIAL AND TEMPERATURE IN HANFORD SOILS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resource Dept.
J. J. C. Hsieh, A. E. Reisenauer, and L. E. Brownell.
Report No. BNWL-1712, 1973. 71 p, 10 fig, 6 tab, 4 append. AEC Contract AT(45-1)-2130.

Descriptors: *Soil moisture, *Infiltration, *Soil temperature, *Soil water movement, *Soil water, Washington, Soil moisture meters, Moisture content, Soil physical properties, Instrumentation, Hydrologic properties, Soil profiles, Recharge.
Identifiers: *Water flux, *Thermocouple psychrometers, *Diode temperature transducers, Hanford reservation, Matric potential.

A new approach to subsurface rainfall movement was initiated by using the energy status of the moisture in the soil profile to quantify the total water flux. To provide the necessary data, in August 1970 a hole was drilled to a depth of 300 feet. Soil samples were taken to determine the hydraulic characteristics of the various sediment horizons. An instrumented cable of thermocouple psychrometers and diode temperature transducers was installed at specific intervals in the well hole. The results of 15 months of data collection do not permit a definite conclusion as to whether precipitation water will eventually reach the groundwater table. The matric potentials seem to indicate that the soil is becoming drier and that the water flux is extremely small. If any flow existed, this minute flow decreased further during the study period. (Sanderson-ISWS)
W75-06240

THE FATE OF SPILLED OIL IN THE SOIL,
Institute TND for Environmental Hygiene, Delft (Netherlands).
For primary bibliographic entry see Field 5B.
W75-06266

DESCRIPTION OF WATER AND AIR MOVEMENT DURING INFILTRATION,
Montana State Univ., Bozeman. Dept. of Civil Engineering.
R. L. Brustkern, and H. J. Morel-Seytoux.
Journal of Hydrology, Vol 24, No 1/2, p 21-35, January 1975. 10 fig, 4 ref. OWRR Contract B-033-Colorado, Grant 14-01-0001-1886.

Descriptors: *Infiltration, *Air, *Immiscibility, *Unsaturated flow, Equations, Darcys law, Continuity equation, Pore pressure, Atmospheric pressure, Saturation, Velocity, Permeability, Movement, Analytical techniques, Mathematical studies, Water table.
Identifiers: *Integral equation, Fractional flow function, Counterflow.

An approximate analytical solution for the problem of one-dimensional infiltration into a homogeneous porous medium was presented. The solution was made possible by assuming that capillary pressure can be partially neglected. Two equations involving two unknowns, water saturation and total velocity, were derived and then solved in a stepwise fashion to yield the saturation profile

and the total velocity at any time. Infiltration quantities were obtained by integration of the area under the saturation profile. Analytical concepts and procedures relevant to the determination of the evolving saturation profile were discussed in some detail. Particular attention was given to the nature and behavior of the fractional flow function. The occurrence of air counterflow during infiltration was also discussed. (Visocky-ISWS)
W75-06288

A NUMERICAL MODEL FOR THE SIMULATION OF UNSATURATED VERTICAL FLOW OF MOISTURE IN SOILS,
Institute for Land and Water Management Research, Wageningen (Netherlands).
G. P. Wind, and W. Van Doorne.
Journal of Hydrology, Vol 24, No 1/2, p 1-20, January 1975. 2 fig, 4 tab, 6 ref.

Descriptors: *Numerical analysis, *Computer models, *Soil moisture, *Unsaturated flow, Unsteady flow, Drainage, Capillary conductivity, Infiltration, Permeability, Moisture tension, Velocity, Rainfall, Water table, Costs, Model studies, Simulation analysis.
Identifiers: *Vertical flow.

A digital model for the simulation of non-steady unsaturated vertical flow of moisture in soils was described. By using an integrated formula for flow velocity errors due to averaging, two conductivity values were avoided. This confines the applicability to situations in which the soil is not too dry. The model also simulates the drainage process. It thus produces the depth of the groundwater table and the discharge data. Other output data are pool depth, runoff, flow velocity at every depth, moisture content, and tension for every layer. A discussion was given on the errors caused by averaging conductivity values in models. A chapter dealt with oscillations caused by too large time steps. The time steps must be chosen in such a way that errors will not be amplified but reduced. The last chapter gave the costs of computation. For soils with low permeability, the model seems to be very cheap to run. A digital model as the one described is fit for short runs with many soils. For long runs with one soil, and analogous model is more appropriate. (Visocky-ISWS)
W75-06289

THE EFFECT OF THE DEPTH OF AN IMPERMEABLE BARRIER ON WATER-TABLE HEIGHTS IN DRAINDED HOMOGENEOUS SOILS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
E. G. Youngs.
Journal of Hydrology, Vol 24, No 3/4, p 283-290, February 1975. 5 fig, 13 ref.

Descriptors: *Drains, *Ditches, *Soils, *Drainage effects, *Water table, Model studies, Rainfall rate, Groundwater barriers, Homogeneity, Seepage, Analysis, Theoretical analysis.
Identifiers: *Hodograph analysis.

The water-table height in a drained homogeneous soil at a given rainfall rate was greater the closer an impermeable barrier was below the drain. Upper and lower limits for the water-table height, between which the true value lies, were estimated from theoretical considerations. These show that the lower the rainfall rate for a given depth of impermeable barrier the greater was the effect on the water-table height. Hydraulic model and electric analogue experiments were in agreement with these results. (Schicht-ISWS)
W75-06294

FLOW IN A VERTICAL POROUS COLUMN DRAINED AT ITS BOTTOM AT CONSTANT FLUX,
Technion-Israel Inst. of Tech., Haifa. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06295

CHEMICAL SOIL STABILIZERS FOR SURFACE MINE RECLAMATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06330

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06337

2H. Lakes

STUDIES ON THE PHYTOPLANKTON IN LAKE KEURUSSELKA; FINNISH LAKE DISTRICT,
Jyvaskyla Univ. (Finland). Dept. of Biology.
P. Eloranta.
Ann Bot Fenn. Vol 11, No 1, p 13-24, 1974.

Descriptors: *Phytoplankton, Lakes, Finland, Eutrophication, Algae.

Spatial and seasonal variations in the species composition and biomasses of the phytoplankton of Keurusselka were studied in 1971. The lake lies in the northeast of the Kokemaenjoki drainage basin, and is the object of a comprehensive study program, the physical and chemical properties of its waters having been treated in an earlier publication. Attention was paid to both the species composition and the proportions of the biomasses comprised by different algal groups (Cyanophyta, Chlorophyta, Chrysophyta, Pyrrophytal). The degree of eutrophication in the different parts of the lake was assessed on the basis of the biomasses. The fluctuations in the numbers of species were studied, as well as the factors influencing species numbers and species composition. Special consideration was given to the relations between biomass, water color, season and biotic diversity. The results revealed limitations in the applicability of the quotient systems.--Copyright 1974, Biological Abstracts, Inc.
W75-05853

STUDIES ON FRESHWATER BACTERIA: THE EFFECT OF ENCLOSURE IN LARGE EXPERIMENTAL TUBES,
Freshwater Biological Association, Windermere (England).
J. G. Jones.
J Appl Bacteriol, Vol 36, No 3, p 445-456, 1973.

Descriptors: *Aquatic bacteria, *Thermal stratification, Hypolimnion.
Identifiers: Acinetobacter, Aeromonas, Flavobacterium, Moraxella, Tarns.

A study of viable aerobic heterotrophic bacteria in the open water of Blelham Tarn (United Kingdom) in 2 large experimental tubes introduced into the tarn, demonstrated certain differences between the populations during the period of thermal stratification. Whereas a relatively stable mixture of several species was found in the tarn, the populations of the tubes were often dominated by cycles of single species, including those from genera tentatively identified as Acinetobacter, Flavobacterium group, Moraxella, coryneform group and Aeromonas. It was not known which factors had caused this change in the species composition, but it was noted that some nutrients, especially phosphate-P and Fe, became depleted in the tubes. The other major differences between the tarn and the experimental tubes was that complete deoxygenation of the hypolimnion was found only in the former. The bacterial populations of the tarn and the tubes were similar after overturn and during all periods when conditions were isothermal.--Copyright 1974, Biological Abstracts, Inc.
W75-05875

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
M. Rahman, and N. Marcotte.
Water Resources Research, Vol 10, No 6, p 1143-1147, December 1974. 3 fig, 2 tab, 13 ref.

Descriptors: *Thermal stratification, *Bodies of water, *Isotherms, *Diffusion, Conductivity, Density stratification, Epilimnion, Turbulence, Solar radiation, Mathematical models, *Water temperature, Meteorological data, *Forecasting, *Thermal pollution, Path of pollutants, *Canada.
Identifiers: *Thermal budget method, Similarity technique, One dimensional unsteady model, Chaleur Bay(St Lawrence gulf), Grand Lake(New Brunswick).

A method of predicting water temperature in large bodies of water was presented. The vertical water column was subdivided into two layers: an isothermal surface layer and a temperature-stratified diffusion layer. Meteorological data, either real or imposed, were used for calculating the variation of water temperature with time in the surface layer utilizing the thermal budget method. Then in the diffusion layer the temperature profiles were obtained by solving the time-dependent energy equation by the similarity technique with variable density, conductivity, and diffusivity, and zero velocity. Calculated water temperatures were compared with the measured values. The comparison showed favorable agreement. (Bhowmik-ISWS)
W75-05959

DETERMINATION OF WATER TEMPERATURE IN SHALLOW WATER BODIES,
Polish Academy of Sciences, Golysz. Fish Culture Station.
M. Szumiec.
Acta Hydrobiol. Vol 15, No 3, p 247-357, 1973, Illus.

Descriptors: *Water temperature, *Lakes, *Ponds.
Identifiers: Bodies, Determination, Linear, Poland, Pond, Regression, Shallow, Temperature, Water.

Methods of measurement and of water temperature using the relationships between the ground and air temperature were discussed. For water bodies such as ponds, the existence of a linear regression between the 2 values was established and presented in the form of equations. A nomogram was calculated separately for each 10-day period of the warm part of the year (May-Sept.). The possibility of applying the results for water bodies situated in various regions of Poland is discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-05969

THE ANNUAL TEMPERATURE CYCLE OF LOUGH NEAGH,
Ministry of Agriculture, Crumlin (Northern Ireland). Freshwater Biological Investigation Unit.
C. E. Gibson, and D. A. Stewart.
Limnol Oceanogr, Vol 18, No 5, p 791-793, 1973, Illus.

Descriptors: *Water temperature, Northern Ireland.
Identifiers: Lough Neagh.

The annual cycle of water temperature in 1969 and 1970 is described for Lough Neagh, N. Ireland (United Kingdom). Water temperature appears to follow air temperature after a lag of 7 days. The annual heat budget is calculated as 13.8 x 1,000 cal cm-2 yr-1.--Copyright 1974, Biological Abstracts, Inc.
W75-06016

IMPACT OF TURBIDITY AND LAKE SEDIMENTATION,
Kansas State Univ., Manhattan.
G. R. Marzolf.
Preprint No. 1547, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 18 p, 1 fig, 2 tab, 17 ref.

Descriptors: *Turbidity, *Sedimentation, *Phytoplankton, *Ecology, *Lakes, *Sediment distribution, *Reservoir silting, Primary productivity, Aquatic productivity, Photosynthesis, Light penetration, Kansas, Particle shape, Particle size.
Identifiers: Tuttle Creek Reservoir.

A biological investigation was conducted on Tuttle Creek Reservoir. It was an attempt to understand some of the ecological interactions of organisms with suspended solids. Tables give the limnological features of the reservoir. The reservoir has relatively shallow water and long-fetch winds which inhibit any thermal stratification. This fact allowed for an assumption of homogeneity. Turbidity was high and was primarily due to silts and clays carried into the lake with high inflows. The material remains suspended because of wind conditions. Both in-sites and incubation measurements of photosynthetic activity in the lake were made. By any scheme of lake classification which uses autotrophic production as a criterion, Tuttle Creek Reservoir would be among the least productive lakes in North America. The annual mean rate of primary production is most likely light limited in the lake. The turbidity of the reservoir allowed only a minimum of light penetration. Siltation of reservoirs decreases their value as flood control mechanisms. When dams are always closed sedimentation is continuous. If the reservoir was filled only part of the time and drained at other times, it would double the time span of flood control capability resulting from that dam. (Poertner)
W75-06053

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
For primary bibliographic entry see Field 5B.
W75-06073

ADAPTATION OF GAME FISH TO HIGHLY ALKALINE DESERT LAKES,
Nevada Univ., Reno. College of Agriculture.
R. E. L. Taylor.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 812, $3.25 in paper copy, $2.25 in microfiche. University of Nevada Center for Water Resources Research Technical Completion Report, September 1974. 3 p. OWRT A-042-NEV(2). 14-31-0001-3528.

Descriptors: *Saline waters, *Rainbow trout, *Nevada, *Saline lakes, Fish populations, *Water temperature, Alkalinity, Sulfates, Hydrogen ion concentration, Dissolved solids, Feasibility studies.
Identifiers: *Pyramid Lake(Nev).

Various species of rainbow trout were tested to analyze their adaptability to saline water. The feasibility of stocking Pyramid Lake, Nevada with rainbow trout as a means of replenishing the fish population of the lake was investigated. None of the species of rainbow trout tested could survive the transplant from fresh to saline water of Pyramid Lake when water temperatures differed. With no temperature differential at the time of transplant, however, the trout were able to survive. Temperature ranges between 45 and 64F were tested, all having successful results as long as the fresh and saline waters were of the same temperature at the time of transplant. The tests also show that rainbow trout can tolerate dissolved solids of 5,000 ppm, alkalinity of 1,340 ppm, sulfate of 245 ppm and a pH of 9.0. This study will enable the various agencies dealing with alkaline lakes to successfully introduce rainbow trout into their saline water areas.
W75-06084

AVAILABILITY OF SEDIMENT PHOSPHORUS TO MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Soil Science.
For primary bibliographic entry see Field 5C.
W75-06090

STRATIFICATION AND BIOGENIC MEROMIXIS IN TASMANIAN RESERVOIRS,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
For primary bibliographic entry see Field 5C.
W75-06116

CARBOHYDRATES FROM LAKE SEDIMENTS,
Nagoya Univ. (Japan). Water Research Lab.
N. Handa, and K. Mizuno.
Geochem J. Vol 7, No 4, p 215-230, 1973, Illus.

Descriptors: Asia, *Lakes, *Sediments, *Lake sediments, *Carbohydrates, Sedimentation, Chemical analysis, Filtration.
Identifiers: Arabinose, Fucose, Galactose, Glucose, Japan, Mannose, Rhamnose, Ribose, Suwa, Xylose, *Saccharides.

Carbohydrate analysis of the sedimentary samples from Lake Suwa (Japan) was conducted to ascertain the total amounts of carbohydrates present and their chemical nature, and to discuss the behavior of carbohydrates during the course of sedimentation. Total carbohydrate was determined in the range from 5.92-8.32 mg/g dry sediment in the samples from the surface to 24-cm depth of lake sediments. These values tended to decrease with depth. Lake sediments gave rhamnose, fucose, ribose, arabinose, xylose, mannose, galactose and glucose as the monosaccharide components when the sedimentary samples were treated with sufuric acid. These monosaccharides were identified as benzoylhydrazones or acetyl derivatives. When alkali extracts of lake sediments were treated by gel filtration using Sephadex G-25, low molecular weight carbohydrates and polysaccharide were separated. The polysaccharide, being major component of alkali extractable carbohydrate of lake sediment, was characterized by analyzing monosaccharide composition, degree of polymerization and type of glycosidic linkage between monosaccharide components. Results indicate that this polysaccharide of lake sediment is originated from diatoms living in this lake rather than from land vegetation. Monosaccharide composition of sedimentary samples from various depths was determined. Its vertical profile indicates that stabilities of monosaccharide components of sedimentary carbohydrate to microbiological attack increase in following order; glucose, galactose, fucose > mannose > ribose, rhamnose, arabinose. Vertical profile of low molecular weight carbohydrates indicates that the carbohydrates are intermediates during the decompositive processes of the polysaccharide in the sediment.--Copyright 1974, Biological Abstracts, Inc.
W75-06125

DISTRIBUTION OF DYNAMIC WATER LEVEL IN A SHALLOW LAKE,
Water Resources Center, Budapest (Hungary).
I. Bogardi, L. Duckstein, and C. C. Kisiel.
Hydrological Sciences Bulletin, Vol 18, No 4, p 473-484, December 1973. 7 fig, 5 tab, 8 ref. NSF Grant GK-35791.

Descriptors: *Shores, *Reservoir stages, *Lake stages, Mathematical studies, Correlation analysis, Least squares method, Probability, Statistics, Lakes, Lake breezes, Fetch, Seiches, Water level fluctuations, Methodology.
Identifiers: *Hungary(Lake Balaton).

Shoreline damage around a large, shallow reservoir may be incurred by high or low static water level as well as from dynamic water level rises induced by wind. The cumulative effects of both types of damage are additive. A homogeneous section of lake shore on Lake Balaton, Hungary, illustrated a case study. A proposed methodology estimated both the distribution function of monthly static water level and monthly maximum rise caused by wind (seiche plus waves). A convolution of the two distribution functions was performed to yield the distribution function of monthly maximum water level. Normal distributions were suggested for either static or dynamic water levels. Extensions and transferability of the methodology were discussed. (Jess-ISWS)
W75-06134

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06170

DISSOLVED SILICA IN LAUREL LAKE: INFLUX, UPTAKE, AND DIFFERENTIAL ACCUMULATION DURING SUMMER STRATIFICATION,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5C.
W75-06190

PRELIMINARY OBSERVATIONS ON THE BIOGEOCHEMICAL CYCLE OF SILICA IN STOCKBRIDGE BOWL (LAKE),
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 5C.
W75-06191

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
T. C. Young, R. K. Johnson, and T. G. Bahr.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 892, $5.25 in paper copy, $2.25 in microfiche. Michigan State University, Institute of Water Research, Technical Report No. 43, March 1975. 107 p, 24 fig, 14 tab, 17 ref, 3 append.

Descriptors: *Lake morphometry, *Lake morphology, Nutrients, Algae, Dredging, Surveys, *Limnology, Hydrologic data, Data collections, *Michigan, Aquatic animals, Lakes.
Identifiers: *Lake Lansing(Mich), Aquatic angiosperms, *Predredging surveys.

Data collected in anticipation of a lake restoration program were combined with data from several early investigations into the limnology of Lake Lansing, Michigan. Lake Lansing is characterized with respect to climate, hydrology, and other physical, chemical, and biological variables, including temperature, light penetration, carbon, phosphorus, nitrogen, algae, aquatic angiosperms, and fish. Conclusions concerning the current

trophic status of the lake and recommendations for further areas of study on research relevant to a renovation are presented.
W75-06199

HYDROLOGIC VARIATIONS AND THE EXTENT OF THE HOLOCENE LAKES IN THE DANAKIL DESERT, (IN FRENCH),
Centre National de la Recherche Scientifique, Bellevue (France), Laboratoire de Geologie du Quaternaire.
F. Gasse, J. C. Fontes, and P. Rognon.
Palaeogeogr Palaeoclimatol Palaeoecol. Vol 15, No 2, p 109-148. 1974, Illus, English summary.

Descriptors: *Lakes, *Deserts, Climates, Floods, Africa, Sedimentation, Groundwater.
Identifiers: Danakil Desert, Ethiopia, Holocene period, Sahara Desert.

During the Holocene period, lake basins existed in some parts of the Danakil Desert. These basins were supplied either by the Awash River or by ground waters flowing through high fissured basaltic flows. It is possible to reconstruct the areas and fluctuations of lake levels because of the preservation of old shore lines. Calcareous and diatomaceous bottom deposits give information about lacustrine paleo-environments (isotopic analyses, diatoms). It is suggested that the Holocene Period started with an extensive lacustrine episode between 11,000 and 7000 years B.P. At least 1 other transgressive stage, of lesser importance took place between about 2000 and 1000 years B.P. The lakes mainly supplied with ground waters (Afrera) exhibit evidence of chemical and biochemical sedimentation. The deposition continued after 7000 years B.P., and indicates a buffering effect owing to the aquifers. Hence, these basins do not have the simple behavior of a rain gauge recording the local climate fluctuations of the Danakil Desert. The Dobi Graben can be partly related to this kind of basin. Because of the strong turbidity of the flood waters, the lakes with both shallow and underground supplies are quickly filled up in the head of the alluvial plain of the Awash River. The lakes at the downward part of the plain (Gamari and terminal Lake Abhe) have been preserved from the solid supply during the 2 humid episodes. During the intermediate stage, the lacustrine regression allowed the transport of silts and muds as far as Lake Abhe. The Awash River has not ceased flowing and the progression of the alluvial deposits isolates some area of retention on the margins of the plain (lacustrine relicts at about 4000 and 5000 years B.P.). After subtracting the local hydrological influences, by means of comparison with the recent phenomena, this succession fits into the general pattern of the Holocene climatic events of the southern margin of the Sahara.--Copyright 1974, Biological Abstracts, Inc.
W75-06243

RECENT AND LATE QUATERNARY CHANGES IN WATER LEVEL,
Department of Energy, Mines and Resources, Ottawa (Ontario). Earth Physics Branch.
R. I. Walcott.
EOS, Transactions American Geophysical Union, Vol 56, No 2, p 62-72, February 1975. 9 fig, 1 tab, 55 ref.

Descriptors: *Water level fluctuations, *Sea level, *Oceans, *Great lakes, Geologic history, Tides, Tidal effects, Water levels, Paleolimnology, Paleoclimatology, Melting, Ice cover, Glaciers, Lakes, Surface waters, Precipitation(Atmospheric), Climatology, Geomorphology, Quaternary period.

Trends of sea level over the last few thousand years show large variations from place to place, not only within areas affected by glacioisostatic rebound, but in islands and along coastlines well removed from the near effects of rebound. Such variation is to be expected, since the ground will experience significant vertical displacements by the differential loading of sea level and ice mass changes. The dominating influences for short-term periodic variation in sea level are tidal and meteorological, and for long-term variation, the deformation of the earth by changes in surface loading and changes in the climate. In the Great Lakes the principal influence is climatic, variation in rainfall over 20-year periods being the most important. Transient variations in water level such as North Sea storm or Gulf coast hurricane surges are the most important variations in social terms; they may also be much more important in the geological record than was previously realized. (Sims-ISWS)
W75-06260

LATE GLACIAL AND POSTGLACIAL PRODUCTIVITY CHANGES IN A NEW ENGLAND POND,
Indiana Univ., Bloomington. Div. of Biological Sciences.
D. R. Whitehead, H. Rochester, Jr., S. W. Rissing, C. B. Douglass, and M. C. Sheehan.
Science (Wash DC). Vol 181, No 4101, p 744-747, 1973, Illus.

Descriptors: *Primary productivity, *Ponds, Diatoms, Crustaceans.
Identifiers: Sedimentary chlorophyll.

During the late glacial and postglacial the productivity of Berry Pond in Berkshire County, Massachusetts (USA), underwent a number of significant oscillations. This is suggested by data on sedimentary chlorophyll degradation products, diatoms, and Cladocera. The productivity changes were apparently controlled by changes in weathering, terrestrial vegetation in the watershed, litter production, and runoff. There are associated changes in cladoceran community structure.--Copyright 1974, Biological Abstracts, Inc.
W75-06261

THE BENTHIC MOLLUSKS OF LAKE CHAD: ECOLOGY, STUDY OF GROWTH, AND ESTIMATION OF BIOMASSES,
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
For primary bibliographic entry see Field 2I.
W75-06262

2I. Water In Plants

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-05923

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
J. N. Kochenderfer.
Ecology, Vol 54, No 2, p 445-448, Early Spring, 1973. 1 fig, 1 tab, 10 ref.

Descriptors: Soil profiles, Soil properties, Measurement, *Root distribution, *West Virginia, *Forests, *Soil types, Soil texture, *Hardwood.

Strip-mine high walls and road cuts less than 2 years old were used to observe root distribution in several soil and forest types common to north-central West Virginia. Seventy-seven to 89% of all the observed root endings were found in the upper 0.6 m of soil; the highest percentages occurred in the northern hardwood type. The number of roots was greatest in coarse soil and decreased as the soil texture became finer. (Forest Service)
W75-05933

PERFORMANCE OF SOYBEANS (GLYCINE MAX (L.) MERRILL) IN THE WET TROPICS AS AFFECTED BY N, P AND K,
H. A. D. Chesney.
Agron J. Vol 65, No 6, p 887-889, 1973.

Descriptors: *Soybeans, Crop production, Nitrogen, Potassium, Potash, Fertilizers.

The cultivation of soybeans (Glycine max) in wet, humid, equatorial countries that have short days is relatively new. Trials were set up on Arakaka clay loam (a yellow podzol, Typic Normudult) to determine soybean performance from application of N, P, and K, and source of N. The variables were: N, O, 22 and 44 kg/ha; P, O, 29 and 58 kg/ha; and K, O, 37 and 74 kg/ha. Urea, (NH4)2SO4 and uramite were the source of N. N significantly influenced yields only during 1 particularly wet season, when it caused a decrease. K significantly increased yields only during this same period of heavy rainfall, with the effect being greater at the higher application of N. Yields were increased by P at all harvests up to application rates of 58 kg/ha for the 1st 2 crops and 29 kg/ha for subsequent crops. The N x K interaction was the only 2-factor interaction that consistently had any significant effect on yield. Source of N had no effect on yield. Oil and protein contents of the seeds were not influenced by N, P, or K. Truog-P in the soil was unaffected by the application of N or K. Fertilizer P and K increased their levels in the soil. Adapted soybean varieties can be successfully cultivated in the wet tropics.--Copyright 1974, Biological Abstracts, Inc.
W75-05955

THE REED, PHRAGMITES COMMUNIS TRIN., IN THE BRUNNSVIKEN, STOCKHOLM 1971 (IN SWEDISH),
Stockholm Univ. (Sweden). Botany Inst.
H.-G. Wallentinus, K. Gustafsson, and B. Soderstrom.
Sven Bot Tidskr. Vol 67, No 2, p 81-96, 1973, Illus, English summary.

Descriptors: *Chemical analysis, *Biomass, Calcium, Magnesium, Nitrogen, Phosphorus, Potassium, Sodium.
Identifiers: *Phragmites-communis, Reed, Sweden, Typha-angustifolia.

Distribution, biomass and ion-contents of P. communis were investigated. Approximately 2% (=3.1 ha) of the water surface is inhabited by Phragmites, and 0.7% by Typha angustifolia. The mean biomass of above ground parts of Phragmites was 23 tons/ha. The contents of P, N, Na, K, Mg and Ca were measured for the material collected in June and Aug. The contents of P, N and K were lower in the autumn, those of Mg, Ca and possibly Na higher. The N/P-ratio was about 19 in June and about 27 in Aug.--Copyright 1974, Biological Abstracts, Inc.
W75-05967

PHYTOPLANKTON PRIMARY PRODUCTION AND ITS MAIN ASSOCIATED VARIABLES IN CATEDRAL BRANCH, MASCARDI LAKE, (IN SPANISH),
Instituto Nacional de Limnologia, Santo Tome (Argentina).
R. E. Maglianesi, M. S. Radici, and M. O. Garcia.
Bol Soc Argent Bot. Vol 15, No 1, p 12-22, 1973, Illus, English summary.

Descriptors: *Phytoplankton, Aquatic plants, Ecosystems, Productivity.
Identifiers: Argentina, Catedral, Lake, Mascardi.

Variations in phytoplankton concentration and in the absolute and relative productivity occurring in the East branch (Catedral) of Mascardi lake (Rio

Negro Province, Argentine Republic) which seems to behave as a closed ecosystem, are described here. The cell concentration per unit surface, calculated for the euphotic zone, rapidly increased from mid winter until spring and then progressively decreased. The winter circulation causes the increase of nutrients concentration in the euphotic zone and consequently a greater phytoplankton productive capacity towards this season. The daily phytoplankton gross productivity ranged between 20 and 200 mg C/sq m/day, with 2 maxima: one in Aug. and another in Jan. These data lead to an annual primary production estimate of 46 g C/sq m/yr.--Copyright 1974, Biological Abstracts, Inc.
W75-05968

THE BENTHIC MOLLUSKS OF LAKE CHAD: ECOLOGY, STUDY OF GROWTH, AND ESTIMATION OF BIOMASSES,
Office de la Recherche Scientifique et Technique Outre-Mer, Fort Lamy (Chad).
C. Leveque.
Cah O R S T O M Ser Hydrobiol. Vol 6, No 1, p 3-45, 1972, Illus.

Descriptors: *Mollusks, *Lakes, *Aquatic populations, Ecology, *Biomass, Aquatic animals, *Benthic fauna, Africa.
Identifiers: Bellamya, Lake Chad, Cleopatra, Melania.

The influence of bottom characteristics upon the benthic mollusks population in lake Chad, as well as the existence of a threshold conductivity (600 micro mhos) limiting the presence of mollusks in the northern part of the lake, was studied. The rather shallow depth does not appear to have any effect upon the bathymetric distribution of organisms. After defining a number of biotopes in the lake, depending on the bottom characteristics and geographic position, the average population per sample for each biotope was calculated from the data resulting from 2 expeditions that took place in 1968 and 1970. For each biotope, the stock of the species generally obey Motomura's abundance distribution law. A number of 'nomocenoses' characterized by the number of constituting species, Motomura's constant (identical to a diversity index) and density of populations were defined. Homogeneity and validity of samples were studied using Taylor's law. As a rule, mollusks have a moderate tendancy toward aggregation. This tendancy is more pronounced for mobile Prosobranchia than for Lamellibranchia whose distribution is closer to random. A study of population affinities indicates the existence of 2 main population areas on the entire lake: the central area, and the eastern and southern areas. The 'Grande Barriere' constitutes a junction between the 2 main areas and represents geographical as well as biological boundary between the northern and southeastern basins. Although populations remained relatively stable from 1968-1970 one could nevertheless observe the existence of an evolutionary phenomenon in the Bol area where Melania have taken the place of Cleopatra on muddy sediments. This phenomenon is not limited to Bol but was also observed on the part of eastern archipelago in 1970. Concerning biomass, the total number of mollusks was estimated to be 3.64 x 10 to the 12th power individuals in 1970 and biomass at 775,000 t (alcoholic weight, shells included). Prosobranchia (90% of the total and 83% of biomass) and particularly Bellamya (45% of biomass) predominates. Biomass is not equally distributed, since 3/4 are concentrated in the 'Grande Barriere' area and contiguous biotopes (45% of the available zone). There is a strong decrease in biomass towards the eastern part and especially towards the northern part of the lake.--Copyright 1974, Biological Abstracts, Inc.
W75-06262

FIELD TEST OF A MODIFIED NUMERICAL MODEL FOR WATER UPTAKE BY ROOT SYSTEMS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
R. A. Feddes, E. Bresler, and S. P. Neuman.
Water Resources Research, Vol 10, No 6, p 1199-1206, December 1974. 6 fig, 2 tab, 35 ref.

Descriptors: *Evapotranspiration, *Soil-water-plant relationships, *Water balance, *Root systems, Plant growth, Evaporation, Transpiration, Root zone, Water utilization, Soil moisture, Profiles, Computer programs, Simulation analysis, Hydraulic conductivity, Darcys law, Retention, On-site investigations.
Identifiers: *Root sink, *Water uptake, Red cabbage.

Data obtained from careful water balance studies on water uptake by the roots of red cabbage were compared with results obtained from a modified numerical model of Nimah and Hanks. In the modified model, the air dry moisture content at the soil surface may vary with time depending on meteorological conditions. The maximum possible rate of evapotranspiration was calculated by considering both meteorological conditions and crop properties. Data were quoted to suggest that the coefficient of the root sink may sometimes vary exponentially with depth. A period of 7 weeks was simulated, and the calculated weekly moisture profiles did not agree completely with those measured in the field. On the other hand, the calculated cumulative rates of evaporation and transpiration were in excellent agreement with the field data. When the original model was used without the suggested modifications, the agreement of these data with the field data was not as good, an indication that some of these modifications actually improve the predictive capabilities of the model. (Sanderson-ISWS)
W75-06265

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
A. P. Draycott, M. J. Durrant, and A. B. Messem.
J Agric Sci. Vol 82, No 2, p 261-268, 1974, Illus.

Descriptors: *Plant growth, *Irrigation effects, Fertilizers, Potassium compounds, Sodium compounds, *Soil moisture, *Weather, *Vegetable crops, Rainfall.
Identifiers: *Beets, *Sugar beets.

The amount of soil moisture used by sugar beet was determined weekly between May and Oct. (1970-72) in plots testing 18,500 and 124,000 plants/ha with and without irrigation. When leaves covered more than 60% of the ground (after mid-June with the large density and after mid-July with the small density) the crop used water at the potential transpiration rate even with soil moisture deficits on plots without irrigation of up to 170 mm. Therefore as irrigation greatly increased sugar yield in 1970 and 1972, it probably did not do so simply by satisfying the crop's water need. In 1970 irrigation appeared to act partly by decreasing the time taken to attain complete leaf cover but in 1972 irrigation had only a slight effect on leaf cover but greatly increased sugar yield, particularly of the large population. With little rainfall, the large density rapidly exhausted the available moisture from the plow layer. It seems likely therefore that irrigation increased yield by giving more leaf cover early and by improving nutrient supply but not by supplying extra water for transpiration. Roots of the larger plant density extended deeper more rapidly than those of the small plant density but roots of both eventually reached 150 cm. This probably explains why the crop was able to use water at the potential rate for much of the season even in prolonged droughts. The maximum amount of water removed from each soil horizon depended on plant density, the water treatments and depth down the profile. The available water capacity estimated from soil texture suggested that with roots to 150 cm, there was 236 mm of available water in the soil. In practice, 124,000 plants/ha given no irrigation used 167 mm of this and 115 mm when irrigation was applied. These experiments, like earlier ones, suggest that on this soil sugar beet only gives large responses to irrigation when it is needed early in the season.--Copyright 1974, Biological Abstracts, Inc.
W75-06317

2J. Erosion and Sedimentation

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05851

SWELL DAMPER,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France).
For primary bibliographic entry see Field 8B.
W75-05896

FLOATING WAVE BARRIER,
W. W. Bowley.
U.S. Patent No. 3,846,990, 4 p, 9 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Shore protection, *Beach erosion, *Waves(Water), Equipment.
Identifiers: *Wave damping, Wave action.

The floating wave barrier is designed to reduce or eliminate kinetic energy of water waves. It consists of several flat surfaced plates that are connected with at least one flexible line. One plate is connected to an anchor on the sea bottom. When the barrier is placed in the water, the plates are positioned at different vertical levels with one plate at or near the surface. The plates are relatively thin and do not present a substantial fixed force against the horizontal component of the wave velocity. When out of phase plate movement causes two plates to move toward each other, the water between them is placed under a compressive force in the vertical direction. This causes the water between the plates to be accelerated horizontally to form a reflected wave in the seaward direction and a transmitted wave in the landward direction. The reflected wave contacts other incoming incident waves to reduce their kinetic energy prior to contacting the barrier and the transmitted wave tends to fill up the wave trough directly preceding it to reduce the vertical force component of the water. These barriers are arranged parallel to the shore being protected at varying distances from the shore so that a given portion of the wave contacts more than one barrier prior to reaching the shore. (Sinha-OEIS)
W75-05898

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of Paris Symposium, September 1974. Effects of Man on the Interface of the Hydrologic Cycle with the Physical Environment-Symposium Int. Assoc. Sci. Hydrol. Pub. No. 113, p 87-95, 1974. 5 tab, 10 ref.

Descriptors: *Erosion, *Deposition, *Sedimentation, Snow, Geology, Streamflow, Forest fires, Roads, Highways, Reservoirs,

Watershed management, Geomorphology, Elevation, Slope, Forests, Brushlands, Flood frequency, *Grazing.
Identifiers: *Rural roads, *Trap efficiency(Reservoirs), Watershed shape, Channel slope.

Deposition of sediment was measured in 48 northern California reservoirs having catchment areas exceeding 5 km2. The measurements were related by principal components analysis to four categories of variables: catchment, streamflow, snow, and land use. Catchment variables included characteristics of topography, geology, and the reservoir. Streamflow variables included relative intensity and amounts of flow during deposition. Snow variables were calculated from elevational distribution and latitude of each catchment. Intensity of land-use was characterized by development of roads for timber harvesting, mining, and recreation, and by uses not primarily related to roads, such as grazing and forest fires. Roads were of five classes--ranging from highways to dirt roads--and three locations--ridge-top, slope, and streamside. Forest fire variables included current fire history and the extent of high-elevation brushfield associated with burning and grazing. Explained variance in sediment deposition ranged from 78 to 83 percent--depending on the model used in analysis. Variables contributing the most to explained variance were, in decreasing order, snow, geology, streamflow, forest fires, and reservoirs. Roads located near streams contributed the most to deposition--twice as much as did roads located elsewhere. Improved secondary roads near streams were the single greatest contributor. (Forest Service)
W75-05916

PLANTING GRASS AND PINE FOR EROSION CONTROL,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05917

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970. Oregon State University, Corvallis, p 55-63, August 1971. 2 fig, 15 ref.

Descriptors: *Erosion, *Suspended sediment, *Sediment transport, Sediment yield, *Water quality, *Turbidity, Bank erosion, Bedload, Mass wasting, *Landslides, *Watershed management, *Lumbering, Forest fires, Soil texture, Channel morphology, Stream erosion, Headwaters, Vegetation effects, Brush control, Roads, Washouts, Slope stability, Geology, Abrasion.
Identifiers: Soil creep, Flood effects, Erodibility, Surface-aggregation ratio, Channel armouring.

New findings are reported; a reanalysis of older studies is presented; and pertinent results in the literature are summarized. Past land use, forest fires, road building, 'poor logging,' and conversion of steep lands to grass have increased sediment discharge by factors ranging from 1.24 to more than 4. Projected future use is expected to increase sediment production by a factor of 4, with 80 percent associated with roads and 20 percent with logging. Major floods have increased subsequent turbidity of streamflow by a factor of 2. The increases were greater in logged areas of watersheds where roads were next to streams and landings were in draws than in undisturbed watersheds. Most landslides were associated with road development, next most with logged areas, and least with undisturbed forest area. The number of turbid days in streamflow varied by a factor of 2.34 with differences in silt plus clay content of soils, by 8.55 with differences in erodibility, and by 4.3 with the percent of gravel. Further, these soil characteristics were predictable from geologic rock types. In a sample calculation, 89 percent of channel bedload became suspended load enroute downstream. Soil creep contributed 15 percent to total sediment discharge from watersheds; channel bank erosion contributed 54 to 55 percent. (Forest Service)
W75-05926

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05932

THE TORLESSE STREAM VORTEX-TUBE SEDIMENT TRAP,
Lincoln Coll. (New Zealand). Tussock Grasslands and Mountain Lands Inst.
J. A. Hayward, and A. J. Sutherland.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 41-53, 1974. 8 fig, 4 tab, 5 ref.

Descriptors: *Trapping, *Sediment transport, *Sediment yield, *Bed load samplers, *Channels, *Erosion, *Vortices, Stage-discharge relations, Froude number, Mannings equation, Trap efficiency, Particle size, Measurement.
Identifiers: Vortex-tube, Transport rates, Unsteady bed load transport, *New Zealand(Torlesse Stream).

A system for measuring the yield and transport rates of bed-load sediment was described. The technique is based on the vortex-tube principle to remove bed load from the stream to an off-channel recovery area. The system allows for both continuous or intermittent recording of sediment movement. Some preliminary results which indicate the unsteady nature of bed-load transport were presented. (Bhowmik-ISWS)
W75-05954

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
L. J. Onesti, and T. K. Miller.
Water Resources Research, Vol 10, No 6, p 1178-1186, December 1974. 2 fig, 7 tab, 34 ref.

Descriptors: *Geomorphology, *Drainage patterns(Geologic), Gradients(Streams), Drainage density, Graded, Meanders, Running waters, Streams, Geologic control, *Wisconsin, *River basins, Variability.
Identifiers: *Fluvial morphology, *Pecatonica River Basin(Wis), Stream order.

Sixteen hydromorphic variables, with observations grouped by stream order, were subjected to principal components analysis to investigate the manner in which variables interact in a downstream direction within a drainage basin. The degree of intercorrelation between variables in a fluvial system is influenced by geology, structure, and variation in the physical characteristics of stream basins. The contention is that since the degree to which these factors are effective varies downstream in an orderly way, the intensity of interaction between variables should also be so ordered. The results of the analysis support this because the variance accounted for by the first and second principal components increased systematically downstream, whereas that associated with principal components three through six generally decreased. The structure of the data was also examined in the context of varimax rotated components, and the changes that occur between lower- and higher-order stream basins were identified. (Jess-ISWS)
W75-05961

INFLUENCES OF MULCH RATE AND SLOPE STEEPNESS ON INTERRILL EROSION,
Instituto Nacional de Tecnologia Agropecuaria, Marcos Juarez (Argentina). Estacion Experimental Agropecuaria.
A. R. Lattanzi, L. D. Meyer, and M. F. Baumgardner.
Soil Science Society of America Proceedings, Vol 38, No 6, p 946-950, November-December 1974. 4 fig, 4 tab, 14 ref.

Descriptors: *Erosion control, *Soil erosion, *Mulching, *Agricultural runoff, *Sediment yield, Simulated rainfall, Erosion rates, Rill erosion, Slopes, Land management, Rain, Soil conservation, Runoff, Sediments, Infiltration, Rainfall intensity, Impact(Rainfall), Sheet erosion, Soil water movement.
Identifiers: Interrill erosion, Straw mulch, Splash erosion.

Soil and water losses from plots representing field areas between rills were studied for four rates of straw mulch at four slope steepnesses. Three simulated rainstorms totaling 2 hours at 6.4 cm/hour were applied to a 61- by 61-cm test area of Russell silt loam soil. Interrill erosion was reduced about 40% by mulch applied at a rate of only 0.5 metric tons/ha and about 80% by 2 tons/ha, as compared with no mulch. Erosion was negligible at the 8 tons/ha rate. Soil losses from the interrill areas at 20% slope were only about double those measured at 2% slope, whereas widely used erosion equations show that total field erosion would increase about 20-fold over this range of steepnesses. Water loss by runoff was independent of slope steepness, but it was slightly reduced by mulch at a rate of 2 tons/ha and was greatly reduced by the 8 tons/ha rate. After 40 minutes of rainfall, sealing of the soil surface by raindrop impact had reduced infiltration rates for treatments with 0 to 2 tons/ha of mulch to only 20% of those with 8 tons/ha. (Sanderson-ISWS)
W75-05964

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-05972

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
L. Rakoczi.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 85-96.(1973) 3 fig, 5 ref.

Descriptors: *Suspended load, *Measurement, *Sampling, *Instrumentation, Rivers, Surveys, Gages, Nuclear meters, Theoretical analysis, Calibrations, Sediments, Suspended solids, Running waters.

The in situ determination and recording of suspended sediment concentrations by nuclear methods may have several important advantages over the traditional sampling techniques. Lightweight portable instruments are available which can easily and safely be operated, and successful

achievements have been made in the field of fixed-location concentration recorders. However, the field calibration of the nuclear gages involves several difficulties and its accuracy depends primarily on the accuracy of the simultaneous traditional sediment sampling. Further development is required in lowering the minimum detectable concentration and in increasing the sensitivity of the nuclear instruments. (See also W75-05973) (Humphreys-ISWS)
W75-05978

RELIABILITY OF BED-LOAD SAMPLING,
Research Inst. for Water Resources Development, Dudapest (Hungary). Dept. of Surface Waters.
J. Csoma.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 97-107 (1973). 5 fig, 3 tab, 11 ref.

Descriptors: *Bed load, *Sampling, *Reliability, *Statistical methods, On-site investigations, Sediment discharge, Measurement, Estimating, Stochastic processes, Sediments, Probability, Analysis.

The results of bed-load measurements are subject to deviations due to the random fluctuation of sediment movement as well as to constant and random errors of sampling. It was demonstrated that the bed-load transport values obtained by a series of samplings under the same hydraulic conditions can be approximated by a distribution function. A statistical method was presented for characterizing the reliability of bed-load measurements. (See also W75-05973) (Humphreys-ISWS)
W75-05979

MECHANISM OF BED LOAD TRANSPORT IN CHANNEL FLOWS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Y. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 467-477. (1973) 4 fig, 1 tab, 3 ref.

Descriptors: *Sediment discharge, *Bed load, *Alluvial channels, Theoretical analysis, On-site investigations, Rivers, Sediment transport, Velocity, Sediments, Equations, Estimation, Flow, Running waters, Energy transfer, Suspended load, Movement, Evaluation.
Identifiers: *River mechanics, USSR.

The phenomenon of solids transport by stream is most closely connected with the process of internal energy exchange in the stream cross section. One of the principal properties of internal process within the stream cross section is the energy transfer from the main zone (with the energy excess) to the energy-deficient bottom zone. This energy is used for channel development and bed load transport. Formulas were derived for (1) calculation of velocity of excess energy, energy transfer and consumption by bed load transportation, and the condition of sediment movement in suspension; and (2) estimation of bed load discharge. Experimental studies established relationships between grain size and water discharge, thickness of active layer and bottom velocity, and velocity of bed load transportation and bed load granulometry. The comparison of bed load discharges calculated by formulas and obtained by employing 'tagged' sands, bathymetrical measurements, and acoustic depth sounding of bottom ridges in all large rivers of the Caucasus was outlined. A formula was presented and recommended for estimating bed load discharges. (See also W75-05973) (Humphreys-ISWS)
W75-06010

APPLICATION OF STATISTICAL METHODS TO THE DISTRIBUTION OF FALL DIAMETER AND FLOW TURBIDITY,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Y. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 479-490, (1973). 3 fig, 9 ref.

Descriptors: *Turbidity, *Suspended solids, Particle size, Statistical methods, Mathematical studies, Distribution patterns, Settling velocity, Distribution, Laminar flow, Turbulent flow, Analysis, Analytical techniques.

In calculations for channel formation of sediment movement and deposition it is important to estimate properly the granulometrical composition of sediments, their fall diameter, and sediment distribution in flow depth. It was theoretically proved that the distribution of granulometrical composition of sediments follows the normal distribution law. On this basis, some regularities of fall diameter distribution were obtained both for laminar settling zone and for turbulent settling zone that are in full agreement with experimental data of a number of investigators. From these relationships, the equation of fall diameter and mean fall diameter distribution was obtained. Also, an equation was determined for turbidity distribution with flow depth that is valid for any velocity distribution law. Comparison of obtained equations with experimental data was satisfactory. (See also W75-05973) (Humphreys-ISWS)
W75-06011

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
J. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 511-518, (1973). 2 ref.

Descriptors: *Model studies, *Theoretical analysis, *Alluvial channels, Hydraulic models, Velocity, Equations, Energy, Gradients(Streams), Hydraulics, Erosion, Roughness(Hydraulic), Rivers, Meanders, Mathematical studies.
Identifiers: Model scale, Distorted model.

A series of problems such as bed formation, velocity distribution, load transport, and sedimentation were solved starting from the energetic concept. The same concept was used as a basis of modeling of erodible channels. While modeling erodible channels' transporting capacity of flow, its energy both in total and in particular was a point of interest which was transfered from central region of flow cross sections to bottom zone with insufficient energy. On the basis of these studies, formulas were obtained for channel modeling of energy. In these formulas velocity distribution changes were taken into account, and this was extremely important for geometric distortion of the model. The method proposed was used for meander straightening modeling and gave a good convergence with the nature. (See also W75-05973) (Humphreys-ISWS)
W75-06014

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-06022

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-06035

COMPUTER SIMULATION OF SEDIMENT DEPOSIT IN AN ALLUVIAL CHANNEL,
South Dakota State Univ., Brookings.
For primary bibliographic entry see Field 8B.
W75-06051

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
For primary bibliographic entry see Field 5B.
W75-06077

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 5G.
W75-06078

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06088

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. N. Foster.
Water Research Foundation of Australia Report No 44, October 1974. 21 p, 5 fig, 69 ref.

Descriptors: *Beach erosion, *Shore protection, *Australia, Coastal engineering, Legislation, Dunes, Littoral drift, Sediment transport, Erosion control, Sands, Recreation demand, Recreation facilities.

The population of Australia lives mostly near the coast, and increasingly uses it as a recreational facility. A review of natural beach processes emphasizes the interdependence of the various zones of a beach in maintaining the stability of the whole; in particular, the frontal dune, which has often been subject to development. Once this has occurred, the difficulty of dealing with both natural and man-made erosion problems is con-

siderably increased. A directed program of data collection, and a rationalization of piecemeal legislation and regulation of beachfront development will be necessary both to mitigate the effects of past mistakes and avoid such mistakes in the future. (CSIRO-Aust)
W75-06113

CARBOHYDRATES FROM LAKE SEDIMENTS,
Nagoya Univ. (Japan). Water Research Lab.
For primary bibliographic entry see Field 2H.
W75-06125

INLET SEQUENCE: A VERTICAL SUCCESSION OF SEDIMENTARY STRUCTURES AND TEXTURES CREATED BY THE LATERAL MIGRATION OF TIDAL INLETS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 2L.
W75-06204

STRUCTURE AND DIRECTIONAL PROPERTIES OF SOME VALLEY SANDUR DEPOSITS IN SOUTHERN ICELAND,
Glasgow Univ. (Scotland). Dept. of Geology.
B. J. Bluck.
Sedimentology, Vol 21, No 4, p 533-554, November 1974. 15 fig, 13 ref.

Descriptors: *Sedimentology, *Deposition(Sediments), *Sand bars, Geomorphology, Channel flow, Channels, Sands, Gravels, Stratification, Ripple marks, Structure, Valleys.
Identifiers: Directional properties, Imbrication, Lineations, Sandur, *Iceland.

Sediments in the valley sandurs of Markarfljot and Landmannalaugar accrete in complex lateral (transverse) bars. Directional structures within the bars are more variable in orientation than the channels which contain them. This greater variability is mainly due to the diversification of the flow, at the low stage, as it moves through the accretion topography of the sandur. Different directional structures preferentially record different stages of the flow: imbrication and lineation form mainly in response to the high flow stage, and have a low degree of dispersion; cross-stratification records the low stage of flow, and has a wide dispersion. Cross-stratification is produced in four main ways: by small deltas, by megaripples, by ripple topped bars, and by migrating accretionary bar banks. Small deltas form at low flow stage; accretionary banks at high. (Sims-ISWS)
W75-06205

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 2L.
W75-06211

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

A STUDY OF RHEOLOGIC PROPERTIES OF ESTUARIAL SEDIMENTS,
California Univ., Berkeley. Hydraulic Engineering Lab., and California Univ., Berkeley. Sanitary Engineering Research Lab.
For primary bibliographic entry see Field 2L.
W75-06222

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

GEOMORPHOLOGY AND SEDIMENTS OF THE INNER NEW YORK BIGHT CONTINENTAL SHELF,
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 2L.
W75-06226

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W75-06228

INTERDISTRIBUTARY BAY SEQUENCES AND THEIR GENESIS,
Oxford Univ. (England). Dept. of Geology and Mineralogy.
For primary bibliographic entry see Field 2L.
W75-06237

NON-COMBUSTIBLE SUSPENDED MATTER IN SURFACE WATERS OFF EASTERN ASIA,
Woods Hole Oceanographic Institution, Mass.
S. Honjo, K. O. Emery, and S. Yamamoto.
Sedimentology, Vol 21, No 4, p 555-575, November 1974. 15 fig, 15 ref. NSF Grant GA-30631.

Descriptors: *Oceanography, *Suspended solids, *Pacific Ocean, Sea water, Sampling, Organic matter, Silts, Diatoms, Microscopy, Electron microscopy, Measurement, Filters, Sedimentation.
Identifiers: *China Sea, Non-combustible matter.

A total of about 1100 well-distributed samples of suspended matter in surface waters off the length of eastern Asia are available. From these samples, 180 were selected for detailed examination of the non-combustible fraction by using optical and electron microscopy along with computer methods of particle measurement and counting. The results showed that, generally, all major components of the suspended matter are most abundant in the nearshore belt (combustible fraction, mineral grains of silt size, skeletal debris, and clay minerals), the result of mechanical transport of detrital sediment and chemical transport of nutrients from the land. Mineral grains of silt size average about 2%, skeletal debris plus clay minerals about 23%, and combustible organic matter about 75% of total sample weights, but the last two categories vary over a wide range depending upon geographical positions of the samples. Most evident is an oceanward decrease in percentage and concentration of the total noncombustible fraction and an oceanward increase in median diameter of the mineral grains. (Sims-ISWS)
W75-06239

FORMATION AND DEVELOPMENT OF BEACH CUSPS ON DEL MONTE BEACH, MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
For primary bibliographic entry see Field 2L.
W75-06250

SEDIMENT INERTIA AS CAUSE OF RIVER ANTIDUNES,
Minnesota Univ., Minneapolis. St. Anthony Falls Hydraulic Lab.
G. Parker.
Journal of the Hydraulics Division, American Society of Civil Engineers, Vol 101, No HY2, Proceedings Paper 11127, p 211-221, February 1975. 3 fig, 1 tab, 14 ref.

Descriptors: *Sediment transport, *Tractive forces, *River beds, *River flow, *Alluvial channels, Froude number, Viscosity, Analytical techniques, Roughness(Hydraulic), Dunes, Bed load, Movement, Hydraulics, Rivers, Sediments.
Identifiers: *Antidunes, Bed forms, Sediment inertial effects, Flow instability.

The formation of antidunes on riverbeds was explained in terms of sediment inertial effects. Due to inertia, bed sediment in transport cannot respond immediately to flow changes. To quantify the effect, a simple equation for sediment momentum balance was derived. A stability analysis indicated that riverbeds are unstable for a specific range of Froude numbers and that the instability leads exclusively to antidune formation. The instability, which was scaled by a dimensionless number representing the ratio of sediment inertia to friction, is a result of a spatial lag of bed load behind bed stress. An analytical relation for spatial lag was obtained, and the lag was estimated for some experimental data. The limits of antidune formation were compared with data. (Singh-ISWS)
W75-06256

BED MATERIAL SIZE CHANGES AND SEDIMENT TRANSPORT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
K. G. Renard.
Transactions of the American Society of Agricultural Engineers, Vol 17, No 6, p 1001-1010, November-December 1974. 7 fig, 3 tab, 8 ref.

Descriptors: *Sediment transport, *Sediment load, *Sedimentology, *Sediment discharge, Tractive forces, Transfer, Movement, Flow, Particle size, Settling velocity, Watersheds(Basins), Mannings equation, *Arizona, Model studies.
Identifiers: *Walnut Gulch watershed(Ariz), Laursen sediment transport model.

Data collected on the Walnut Gulch Watershed were used to illustrate sediment transport problems in ephemeral streams and to verify the Manning-Laursen conceptual model used to describe sediment transport with varying streambed material. Experience with an ephemeral stream such as Walnut Gulch indicates that the Laursen sediment transport relation provides a good estimate of the sediment concentration if the bed material composition is known. Because the bed composition changes between flow events, long term sediment yields are hard to predict unless some historical data are available about the bed material. Because the fine fractions are more easily transported, it is especially important to accurately estimate the fine fraction of the size distribution. (Gibb-ISWS)
W75-06281

SOME CONSIDERATIONS OF STRAIGHTNESS IN CHANNEL FORM RELATING TO THE ESTUARY OF THE MACLENNAN RIVER, SOUTH OTAGO (NEW ZEALAND),
Newcastle Univ. (Australia). Dept. of Geography.
For primary bibliographic entry see Field 2L.
W75-06285

SEDIMENT YIELD FROM STRIP-MINED WATERSHEDS IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06332

2K. Chemical Processes

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. L. Fredriksen.
In: Proceedings--Research on Coniferous Forest Ecosystems--A Symposium. Bellingham, Washington--March 23-24, 1972, p 115-131, (1972). 8 fig, 2 tab, 14 ref. PNW-1602.

Descriptors: Nitrogen, Phosphorus, Silica, Sodium compounds, Potassium, Calcium, Magnesium, Streamflow, *Douglas fir trees, Precipitation(Atmospheric), Cations, Weathering, Nutrient removal, *Oregon, *Demonstration watersheds, *Nutrient requirements.

Annual loss of nitrogen, phosphorus, silica, and the cations sodium, potassium, calcium, and magnesium followed the same pattern as annual runoff which is heavily dominated by winter rainstorms arising from the Pacific Ocean. Even though 170 and 135 cm of water passed through this Douglas-fir ecosystem for the 2 years reported here, this ecosystem conserved nitrogen effectively as indicated by an average annual dissolved nitrogen outflow of 0.5 kg/ha from an annual average input of 1.0 kg/ha in precipitation. There was a small annual net loss of phosphorus (0.25 kg/ha). Cation input in precipitation was less than 10 percent of sources from mineral weathering--indicating that mineral weathering was the principal source of cations to the system. Average annual net losses of calcium, sodium, magnesium, and potassium were: 47, 28, 11, and 1.5 kg/ha, respectively. Silica loss of 99 kg/ha-yr was the largest of all constituents and came entirely from within the forest system. Although loss of sediment was low during the period of study, loss of nutrients by soil erosion may become of major importance over a longer time scale due to widely spaced unsampled catastrophic erosion. (Forest Service)
W75-05923

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-05931

HYDROCHEMISTRY OF THE ATHABASCA AND NORTH SASKATCHEWAN RIVERS IN THE ROCKY MOUNTAINS OF CANADA,
McGill Univ., Montreal (Quebec). Dept. of Geography.
J. J. Drake, and D. C. Ford.
Water Resources Research, Vol 10, No 6, p 1192-1198, December 1974. 4 fig, 3 tab, 12 ref.

Descriptors: *Rocky Mountain region, *Geochemistry, *Water chemistry, Streams, Hydrogeology, Geologic control, Carbonate rocks, Ions, Watersheds(Basins), Surface-groundwater relationships, Correlation analysis, Calcite, Snowmelt, Mixing, Mathematical models, Discharge(Water), *Canada.
Identifiers: *Athabasca River(Canada), *North Saskatchewan River(Canada), Ionic ratios.

The hydrochemical behavior of the Athabasca and North Saskatchewan Rivers at their points of departure from the Rocky Mountains during the period May 1967 to February 1970 was shown to be well represented by a model based upon the mixing of two water bodies. These component sources contribute varying proportions of the total discharge through the year. One of them has properties that are in keeping with the theoretically expected and the observed characteristics of surface runoff water in the area and essentially represents snowmelt water. The properties of the other component are similarly in keeping with those expected and observed for groundwater in the rock and glacial aquifers of the area. (Visocky-ISWS)
W75-05956

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06026

DETERMINATION OF METALS IN SEA WATER,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W75-06027

ADSORPTION OF ORTHOPHOSPHATE ON BOROSILICATE AND 'CITRATE OF MAGNESIA BOTTLES' POLYETHYLENE AND POLYVINYL SURFACES IN A DISTILLED WATER AND SEAWATER MATRIX,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06029

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06030

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
For primary bibliographic entry see Field 5A.
W75-06086

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
W. C. Neely, and T. D. Hall.
Applied Spectroscopy, Vol 28, No 6, p 578-580, November-December 1974. 3 fig, 13 ref. OWRT A-035-ALA (5).

Descriptors: *Water quality, *Analytical methods, Instrumentation, *Cryogenics, Absorption, *Spectroscopy, Ultraviolet radiation, Measurement.
Identifiers: *Low temperature absorption.

Many authors have noted the importance of low temperature absorption spectra and have described various attachments to obtain these with commercial instruments. The present modification appears to be superior to most of the reported methods for low temperature absorption measurements between room temperature and -180C in the ultraviolet and visible region. The obtainable accuracy is approximately plus or minus 1%. Distortion inducing curved surfaces are eliminated, and light-reducing multiple interfaces are minimized. The greatest disadvantage is that this instrument is single beam.
W75-06092

SPECTROANALYTICAL PARAMETERS OF FUNGAL METABOLITES. IV. MONILIFORMIN,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06093

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
H. Rosen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-782 104, $4.25 in paper copy, $2.25 in microfiche. Technical Report No. 74-83, May 1974. 48 p, 5 fig, 6 tab, 2 ref, 3 append.

Descriptors: *On-site tests, *Water analysis, *Analytical techniques, Water properties, *Testing procedures, Analysis, Evaluation, Chemical analysis, Instrumentation, Chemistry, Laboratory tests, Chlorides, Alkalinity, Hardness(Water), Sulfates, Hydrogen ion concentration, Turbidity, Water purification, Physical properties, Coagulation.
Identifiers: Dip strips, Quantabs, Barium chloranilate, Impregnated paper strips.

Three tests which had previously been developed for a candidate water test kit were sent to the USA Test and Evaluation Command for evaluation. These tests were for chloride, alkalinity, and hardness. The chloride and alkalinity partially met the criteria, but the hardness test failed to meet the criteria. In addition, a new test for sulfate was developed which shows much promise but which must be tested and developed further. (Henley-ISWS)
W75-06122

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
Available from the National Technical Information Service, Springfield, Va. 22161 as NASA CR-2505, $3.25 in paper copy, $2.25 in microfiche. Report No. NASA CR-2505, January 1975. 23 p, 3 fig, 4 tab. NASW-2454.

Descriptors: *Oxygen, *Polarographic analysis, *Instrumentation, *Analytical techniques, *Oxygen requirements, Aeration, Control systems, Chemical analysis, Automatic control, Water quality control, Oxygen demand, Respiration, Productivity, Water properties, Dissolved oxygen analyzers, Measurement, Sport fishing, Gases.
Identifiers: *Space cabin atmospheres, Biomedical studies, Electrochemical cells.

Early biomedical studies of space cabin atmospheres found that oxygen measuring instruments which could hold calibration and accuracy for periods up to 2 weeks were not available. The new membrane-type oxygen sensors are inherently stable, and permit direct reading of oxygen in gas mixtures and in liquids. (Henley-ISWS)
W75-06136

MASS SPECTROMETRY AS USED TO DETERMINE TRACE ORGANIC CONSTITUENTS IN AQUATIC SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06188

DETERMINATION OF ORGANIC COMPOUNDS IN AQUATIC SYSTEMS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.

For primary bibliographic entry see Field 5A.
W75-06189

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
W. W. Ho, A. W. Love, and M. J. Van Melle.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA CR-2458, $3.75 in paper copy, $2.25 in microfiche. NASA Contractor Report 2458, December 1974. 35 p, 17 fig, 5 tab, 4 ref. NAS 1-10691.

Descriptors: *Sea water, *Water properties, *Electrical properties, Remote sensing, Electromagnetic waves, Temperature, Salinity, Estuaries, Bays, Measurement, Instrumentation, Radio waves.
Identifiers: Sea surface temperature, *Dielectric properties, Radiometers.

For the remote determination of salinity and temperature of water surfaces of estuaries and bay regions to accuracies of 1 ppt salinity and 0.3 kelvin surface temperature, the combination of L-band (1.4 GHz) and S-band (2.65 GHz) radiometers as brightness temperature detectors was obtained because the brightness temperature of 1.4 GHz depends mainly on the salinity and at 2.65 GHz mainly on the surface temperature. The determination of the brightness temperature versus salinity with the water surface temperature as a parameter for 1.4 GHz was performed with a capillary tube inserted into a resonance cavity. Detailed analysis of the results indicated that the measured values are accurate to better than 0.2% in the electric property epsilon prime and 0.4% in epsilon double prime. This implies that the calculated brightness temperature as a function of temperature and salinity is better than 0.2 kelvin. This in turn gives the possibility to reduce the measured data obtained with the two-frequency radiometer system with 1 ppt accuracy to values in the salinity range 5 to 40 ppt. (Sims-ISWS)
W75-06247

THE APPLICATION OF ELECTRODEPOSITION TECHNIQUES TO FLAMELESS ATOMIC ABSORBTION SPECTROMETRY PART II. DETERMINATION OF CADIUM IN SEA WATER,
Oslo Univ. (Norway). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06301

MOLECULAR EMISSION CAVITY ANALYSIS (MECA) - A NEW FLAME ANALYTICAL TECHNIQUE, PART IV THE DETERMINATION OF ARSENIC AND ANTIMONY,
Birmingham Univ. (England). Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06302

AN ANALYTICALLY USEFUL COULOMETRIC GENERATION OF MICRO AMOUNTS OF METAL IONS, PART II. ELECTROGENERATION OF LEAD (II),
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-06304

A STUDY OF THE OPTIMAL CONDITIONS FOR FLAMELESS ATOMIC ADSORPTION SPECTROMETRY OF IRIDUM, PLATINUM AND RHODIUM,
Ghent Rijksuniversiteit (Belgium). Lab. of Analytical Chemistry.
For primary bibliographic entry see Field 5A.
W75-06307

SOLVENT EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF NICKEL (II) WITH THIOTHENOYLTRIFLUOROACETONE,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06308

THE SEPARATION OF ZINC AND COPPER FROM SEAWATER BY ADSORPTION COLLOID FLOTATION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06309

ION EXCHANGE BEHAVIOR OF MERCURY (II) IN MIXED SOLVENTS: SEPARATION FROM ZINC (II), CADMIUM (II), GOLD (III), AND THALLIUM (III),
Roorkee Univ. (India). Chemical Lab.
For primary bibliographic entry see Field 5A.
W75-06310

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-06338

2L. Estuaries

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
For primary bibliographic entry see Field 2H.
W75-05959

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For primary bibliographic entry see Field 5A.
W75-06020

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
For primary bibliographic entry see Field 5A.
W75-06026

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06030

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5A.
W75-06035

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06036

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W75-06037

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 5A.
W75-06038

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5A.
W75-06039

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06040

A TIME-DEPENDENT, TWO-DIMENSIONAL MATHEMATICAL MODEL FOR SIMULATING THE HYDRAULIC, THERMAL, AND WATER QUALITY CHARACTERISTICS IN SHALLOW WATER BODIES,
Oak Ridge National Lab., Tenn.
For primary bibliographic entry see Field 5B.
W75-06046

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-06113

THE HYDRAULICS OF THE SOUTH AUSTRALIAN GULF SYSTEM. I. CIRCULATION,
Flinders Univ., Bedford Park (Australia).
For primary bibliographic entry see Field 5B.
W75-06115

THEORETICAL ANALYSIS OF CONDITIONS IN A SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
M. Rattray, Jr., and E. Mitsuda.
Estuarine and Coastal Marine Science, Vol 2, No 4, p 375-394, October 1974. 14 fig, 3 tab, 25 ref. NSF Grant GA-30745X3.

Descriptors: *Washington, *Saline water intrusion, *Path of pollutants, Saline water-freshwater interfaces, *Estuaries, Steady flow, Mathematical models, Saline water, Stratification, Water circu-

lation, Velocity, Profiles, Stress, Boundary layers, Slopes, Friction, Entrainment, River flow, Reynolds number, Flumes, *Mississippi River, Theoretical analysis.
Identifiers: *Salt wedges, *Duwamish River(Wash), Halocline.

Theoretical results were obtained for salt-wedge estuaries which give the velocity profile, stress distribution, and shape and length of the wedge for steady-state flow conditions. It was assumed that the cross section is rectangular. Cases were presented for both constant depth and uniformly sloping bottom. The dynamics resemble those found in open channel flow with the addition of a laminar boundary layer at the interface between the wedge and the upper layer. The theory gives reasonable predictions for the length and shape of salt wedges observed in flumes and in the Mississippi and Duwamish Rivers. (Visocky-ISWS)
W75-06117

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
For primary bibliographic entry see Field 2E.
W75-06118

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
W. S. Richardson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 787, $4.75 in paper copy, $2.25 in microfiche. Report No. CG-D-18-75, February 1974. 84 p, 3 fig, append. DOT-CG-20859-A.

Descriptors: *Currents(Water), *Instrumentation, Oceans, *Path of pollutants, On-site tests, Sampling, Aerial photography, Measurement, Aircraft, *Florida, *Computer programs, Coasts, *Atlantic Ocean.
Identifiers: Airborne current measurements.

Modifications and improvements to expendable probes for the measurement of oceanic currents from aircraft were described. These probes can also be used from helicopters or surface craft. The probe contains two floats, each containing a dye packet, and a timing mechanism that releases the floats after they reach the bottom of the body of water into which they were dropped. At a preset time, a red float is released and, after a preset time delay, a white float is released. These floats rise under their own buoyancy at a known rate. Upon surfacing, the floats capsize and dispense a highly visible, bright green dye to assist in locating the colored floats. The direction and speed of the surface current can be calculated from either visual or photograph observations of the float positions. Some results showing measurements along the Atlantic coast of southern Florida were presented. An appendix consists of a manual on the operation, assembly, and use of this probe. This manual described in detail the construction, assembly, and use of the probe. An appendix of the manual contains a listing of the Fortran program used to calculate the surface current from photographic measurements of the float locations. (Sims-ISWS)
W75-06129

SUBMARINE UPWELLING DUE TO A STEADY THERMAL FRONT IN A VISCID FLUID,
Department of the Environment, Ottawa (Ontario). Marine Sciences Directorate.
T. S. Murty, and G. V. Rao.
Manuscript Report Series No. 35, 1974. 71 p, 7 fig, 17 tab, 26 ref, append.

Descriptors: *Upwelling, *Ocean currents, *Stratification, *Circulation, *Numerical analysis, Momentum equation, Continuity equation, Density, Temperature, Velocity, Analysis, Atlantic Ocean, Pacific Ocean, Model studies.
Identifiers: Thermal front, Stream function.

Although customary scale considerations have yielded a range of 0.001 to 0.01 centimeters per second for the vertical motion in the oceans, in special situations such as oceanic thermal fronts, the value could be much higher. A primitive twenty-level numerical equation model was developed to compute the vertical motions in these situations. Seven case studies of fronts, four in the Atlantic Ocean and three in the Pacific Ocean, were made. Typical values of the vertical velocities calculated with the model were usually about 0.1 centimeter per second, with a maximum of about 1 centimeter per second. Though these values may appear too large to be realistic, some recent observations suggested that such large vertical motions could arise in special situations. (Adams-ISWS)
W75-06131

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science; and Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
R. R. Long.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 112, $3.25 in paper copy, $2.25 in microfiche. Technical Report No. 5 (Series C), August 1974. 12 p, 7 fig, 11 ref, append. ONR Contract No N00014-67-A-0013.

Descriptors: *Estuaries, *Mass transfer, *Water circulation, *Oceanography, *Currents(Water), *Salinity, Mixing, Sea water, Stratification, Circulation, Froude number, Flow, Hydrology, Model studies, Mathematical models, Theoretical analysis.
Identifiers: *Halocline, Salt transfer.

The problem of mass and salt circulations in a fjord-type estuary, into which there is a steady discharge of fresh water, was re-examined. A contribution to this problem was made by Stommel and Farmer, who examined the relation between the fresh-water supply and the density difference between the upper and lower fluids. These are frequently separated by a pronounced halocline. Stommel and Farmer assumed a critical condition at the entrance to the estuary and closed the problem by assuming an 'over-mixed' state in which the salinity of the upper fluid is a maximum subject to the other constraints of the problem. In the present paper critical conditions (with a simple justification) were also assumed, but the problem was closed by assuming constant and equal Froude numbers in each layer in the double flow at the entrance. The result was closer to the experimental observations of Stommel and Farmer than their own theory. The depth of the halocline in the estuary was also predicted by using recent laboratory experiments relating the depth to the entrainment velocity. The theoretical prediction agreed well with measured depths in an experiment. (Sims-ISWS)
W75-06133

THE INFLUENCE OF SURFACE WAVES ON WATER CIRCULATION IN A MID-ATLANTIC CONTINENTAL-SHELF REGION,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
C. H. Whitlock, and T. A. Talay.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TND-7771, $3.75 in paper copy, $2.25 in microfiche. NASA TN D-7771, December 1974. 45 p, 11 fig, 5 tab, 24 ref.

Descriptors: *Ocean waves, *Ocean circulation, *Waves(Water), *Circulation, *Continental shelf, Currents(Water), Atlantic Ocean, Winds, Tides, Analysis, Velocity.
Identifiers: *Swells, Gulf Stream, Wind shear, Stokes waves.

The importance of wave-induced currents in different weather conditions and water depths (18.3 m and 36.6 m) was assessed in a mid-Atlantic continental-shelf region. A review of general circulation conditions was presented. Factors that perturb the general circulation were examined by using analytic techniques and limited experimental data. Actual wind and wave statistics for the region were examined. Relative magnitudes of the various currents were compared on a frequency of annual occurrence basis. Results indicated that wave-induced currents were often the same order of magnitude as other currents in the region and became more important at higher wind and wave conditions. Wind-wave and ocean-swell characteristics were among those parameters that must be monitored for the analytical computation of continental-shelf circulation. (Adams-ISWS)
W75-06137

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.
W75-06179

UNSTEADY SALINITY INTRUSION IN ESTUARIES, (PART I AND PART II),
Massachusetts Inst. of Tech., Cambridge. Ralph M. Parsons Lab. for Water Resources and Hydrodynamics.
D. R. F. Harleman, J. S. Fisher, and M. L. Thatcher.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-782 804, $3.75 in paper copy, $2.25 in microfiche. Technical Bulletin No 20, July 1974. 35 p, 15 fig, 2 tab, 12 ref. Contract No DA-22-079-CIVENG-65-20.

Descriptors: *Estuaries, *Tidal effects, *Saline water intrusion, *Mathematical models, Laboratory tests, Model studies, Continuity equation, Momentum equation, Velocity, Analysis, Numerical analysis, Profiles.
Identifiers: *Transient flow, *Freshwater inflow, Diffusion coefficients.

In Part I, a one-dimensional numerical model was developed for predicting the transient salinity intrusion under conditions of varying freshwater inflow. The model coupled the one-dimensional continuity and momentum equations for unsteady tidal motion in an estuary with the mass transport equation for salt. The model incorporated variable estuary geometry and roughness, time-dependent boundary conditions of tidal range at the ocean end, and variable freshwater inflow at the head end and from tributaries along the estuary. The numerical model predictions were compared with salinity measurements in a salinity flume over 25 tidal cycles during which time the freshwater inflow was decreased at a uniform rate. The results were also compared with field observations in the Delaware, Potomac, and Hudson estuaries. A user's manual was prepared for the model. In Part II, a two-dimensional analytical model was developed for predicting vertical distributions of velocity and salinity, averaged over a tidal cycle. The numerical model described in Part I was used to determine the logitudinal salinity gradient which was assumed to be independent of depth. The two-dimensional model was governed by vertical and longitudinal equations of motions, equations of

continuity and salt conservation, and an equation of state relating salinity and density. Dimensionless correlations between mean vertical mass and momentum transfer coefficients and gross estuary characteristics, based on previous experimental data, were used to predict vertical velocity and salinity flume. Comparisons of predicted and observed profiles were given. (Adams-ISWS)
W75-06184

WIND DRIFT SURFACE CURRENTS AND SPREAD OF CONTAMINANTS IN SHELF WATERS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
For primary bibliographic entry see Field 5B.
W75-06187

INLET SEQUENCE: A VERTICAL SUCCESSION OF SEDIMENTARY STRUCTURES AND TEXTURES CREATED BY THE LATERAL MIGRATION OF TIDAL INLETS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
N. Kumar, and J. E. Sanders.
Sedimentology, Vol 21, No 4, p 491-532, November 1974. 14 fig, 1 tab, 77 ref. NSF Grant GA-25792.

Descriptors: *Inlets(Waterways), *Tidal effects, *Barrier islands, *Sedimentology, Sediments, Erosion, Stream erosion, Bank erosion, Sediment transport, Geology, Geomorphology, Movement, Drilling, Boreholes, Channels, Tidal streams, Estuaries, Water circulation, *New York, Sedimentation.
Identifiers: *Long Island(NY).

Tidal inlets, narrow, comparatively deep gaps between barrier islands, are channels through which tidal currents flow vigorously as the water enters and leaves the backbarrier lagoons, bays, and intertidal flats and marshes. Many geologists have compared tidal inlets to river channels and have speculated that if an inlet shifts laterally, it should deposit a distinctive sequence of sediments, analogous to the point-bar sequence left by a meandering stream channel. Fire Island Inlet, located 56 km east of New York City, has migrated WSW at a mean rate of 64 m/year during the period 1825-1940. Waves approaching the coast, predominantly from the southeast, have shifted sediment along the shore toward the WSW. Deposition of sediment on the east side of the inlet has forced the tidal currents to erode the west side of the inlet, thus causing lateral migration. Because hydraulic conditions vary from the channel floor to the subaerial part of the spit which is present on the ENE side of the channel, sedimentary structures and textures vary systematically with depth. An inlet sequence which is formed by the lateral migration of a tidal inlet was proposed. The sediments belonging to various units in this sequence were identified in four borings made on those parts of Fire Island through which the Fire Island Inlet has migrated since 1825. This sequence should be applicable to other inlets also. (Sims-ISWS)
W75-06204

THE TRANSVERSE DISTRIBUTION OF VELOCITY IN ESTUARY FLOW,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
P. R. B. Ward.
Journal of Hydraulic Research, Vol 12, No 2, p 253-274, 1974. 8 fig, 1 tab, 11 ref.

Descriptors: *Estuaries, *Homogeneity, *Tidal effects, *Velocity, *Roughness(Hydraulic), Laboratory tests, Waves(Water), Friction, Flow, Channels.
Identifiers: Phase shifts, Strouhal number, Sidewall roughness, Transverse velocity variations, Inertial force.

Homogeneous estuary flows and tidal models of estuaries are known to exhibit a phase shift effect. The velocity versus time curves from various positions in the transverse direction (perpendicular to the long axis) may be shifted relative to one another by times of as much as 1 hour. An explanation of this phase shift was presented in terms of the magnitude of the relevant forces. A Strouhal number, proportional to fu sub o T/d, where f is the friction factor, u sub o is the longitudinal velocity, T is the tidal period, and d is the depth of flow, was shown to be important in describing the amount of phase shift. Two situations which resulted in horizontal phase differences were analyzed, and laboratory measurements of both cases were presented. In one case the phase difference resulted from a slow variation of depth with position z, and in the second case the phase shift resulted from the influence of very large sidewall roughness in a deep channel. (Bhowmik-ISWS)
W75-06206

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
J. J. Leendertse, and S-K. Liu.
R-1612-NYC, September 1974. 74 p, 29 fig, 6 tab, 5 ref, 1 append.

Descriptors: *Estuaries, *Hydraulic models, *Mathematical models, Model studies, Mathematics, Computer models, Tides, Currents(Water), Water circulation, Water levels, *New York.
Identifiers: Jamaica Bay(NY).

The effects on tide levels, currents, water quality, and navigation conditions of a proposed hurricane barrier across the entrance of Jamaica Bay are presently being studied. Because a physical model is used to predict current patterns and tide levels resulting from different barrier designs, it had to be precisely adjusted for the present condition in order to make accurate predictions. Cross-spectral analysis was used to establish the amplitude and phase relationships for different tidal components between pairs of tide level stations in the bay and in the model. This made it possible to compare very accurately the propagation and amplification of these tidal components in the model with those in the bay, even though actual tide level variations at the bay entrance could not be reproduced by the model. By means of this information the flow resistance in the model was further adjusted in two steps by adding resistance strips in the channels until the amplitude and phase relationships obtained from the model were in agreement with those obtained from prototype data for the tidal components. The phase lags and amplification of the semidiurnal tide in the Jamaica Bay model, after adjustments by use of the cross-spectral method, agree well with those obtained from field measurements. (Sims-ISWS)
W75-06209

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
C. A. Whitehurst, and R. P. Self.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-26911, $3.75 in paper copy, $2.25 in microfiche. Louisiana State University, Baton Rouge, Research Monograph 3, May 1974. 26 p, 7 fig, 3 tab, 4 ref. NASA Grants 19-001-097, 19-001-024.

Descriptors: *Sedimentation, *Erosion, *Remote sensing, Sediment transport, Estuaries, Bays, Aerial photography, Infrared radiation, Photography, Water circulation, Tides, Tidal effects, Gulf of Mexico, Marshes, *Louisiana.
Identifiers: Lafourche Parish(La).

During the summer of 1972, studies of the marshlands in southern Louisiana were initiated with airborne infrared and multispectral imagery. The Fourchon study area is bound by the Gulf of Mexico on the south, Lake Champagne on the east, Pass Fourchon on the west, and the canal leading to Belle Pass on the north. It encompasses an area slightly greater than one square mile and is typical of the coastal environment of southern Louisiana. Problems exist in the use of airborne imagery in sedimentological studies of marshes because vegetational differences do not always reflect sediment differences and the homogeneous marsh sediments and minute differences do not show on the photographs. Spoil banks, canals, channels, beaches, and marshes are easily defined from aerial photographs since each of these environments contain different soils and sediments. Remotely sensed data can be used to explore for and map surficial or near surface sand bodies over wide areas. (Sims-ISWS)
W75-06211

AN INVESTIGATION OF SURFACE AND INTERNAL WAVE-INDUCED TURBULENCE IN SHALLOW WATER THERMAL MICROSTRUCTURE,
Naval Postgraduate School, Monterey, Calif.
J. W. Powell.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 632, $4.75 in paper copy, $2.25 in microfiche. MS Thesis, March 1974. 83 p, 25 fig, 7 tab, 14 ref. ONR Project NR 083-275.

Descriptors: *Turbulence, *Temperature, *Waves(Water), *Correlation analysis, *Frequency analysis, *Pacific Ocean, *California, Analysis, Velocity, Thermocline, Stability, On-site data collections.
Identifiers: Wavenumber, Microstructure, Mission Beach(Calif).

Measurements of temperature, wave height, and orthogonal water particle velocity were made in May 1973 one mile off Mission Beach, California. A detailed analysis of the temperature field was made by using digital temperature and isotherm contour plots. Billow turbulence microstructure appeared to be the dominant mechanism, except for one run in which evidence of double-diffusion microstructure was found. Spatial correlation lengths, calculated from the plot of the covariances, were of the order of 130 cm and less when the signal was high-pass filtered for waves of 100 seconds and longer. No depth dependence was noticed. Both frequency and wavenumber spectra were calculated and a correspondence between the spectra was noted at the frequency and wavenumber of the surface wave-induced particle displacements. The Thornton, Boston, Whittemore model of wave-induced temperature fluctuations was tested and found to model the temperature spectra quite well, especially in a narrow band of frequencies associated with surface waves. The turbulent temperature spectrum, calculated as the difference between the actual and wave-induced spectra, had a slope which was near -5/3 above 0.1 Hz but more negative at lower frequencies. (Adams-ISWS)
W75-06213

BOLINAS LAGOON INLET, CALIFORNIA,
California Univ., Berkeley. Hydraulic Engineering Lab.
J. W. Johnson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 747, $3.75 in paper copy, $2.25 in microfiche. Army Coastal Engineering Research Center, Fort Belvoir, Virginia, Miscellaneous Paper No. 3-74, May 1974. 46 p, 21 fig, 3 tab, 41 ref.

Descriptors: *Inlets(Waterways), *Hydraulic engineering, *Lagoons, *Bays, Waves(Water), Littoral drift, Sediments, Beaches, Tidal bores, Currents(Water), Sediment transport, *California.

Identifiers: Tidal prism, *Bolinas Bay(Calif).

The hydraulic and sedimentary characteristics of tidal inlets on sandy coasts have long been of interest to engineers involved in harbor design and maintenance. O'Brien (1931), in a study of west coast inlets, proposed a relationship between the minimum inlet area below mean sea level and the tidal prism. Other investigators in recent years have proposed similar relationships. A reanalysis of data from inlets on U.S. coasts by O'Brien (1967), resulted in a later observation (O'Brien, 1971); he believed that the equilibrium relationship between inlet area and tidal prism as he originally proposed seemed to be a first approximation only and that the next effort should be for quantative understanding of deviations from the approximation. If the flow area is determined by the tidal prism, then this area is in constant process of adjustment because the tide range, and the related tidal prism, varies continually. The Bolinas Bay-Bolinas Lagoon system is a natural laboratory in which a large amount of data has been compiled on hydrography, wave action, tidal hydraulics, sediment transport and sedimentation, and the ecosystem. However, the data are insufficient to adequately define the importance of the inlet area and tidal prism. The source, nature, and availability of data on the Bolinas Lagoon inlet were summarized as a guide to possible future studies at Bolinas, and at other inlets. (Sims-ISWS)
W75-06217

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
W. C. Krumbein, and W. R. James.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 572, $4.75 in paper copy, $2.25 in microfiche. Army Coastal Engineering Research Center, Fort Belvoir, Virginia, Technical Memorandum No. 44, June 1974. 79 p, 33 fig, 3 tab, 12 ref. DACW72-70-C-0011, 71-C-0007, 72-C-0002, 72-C-0010.

Descriptors: *Beaches, *Beach erosion, *Deposition(Sediments), Shores, Coasts, Coastal engineering, Shore protection, Waves(Water), Sands, Markov processes, Groins(Structures), Engineering structures, Flow control, Sediment transport, Soil analysis, Soil aggregates, Physical properties, *California.
Identifiers: Point Mugu(Calif).

Contour maps of beach foreshore properties, such as mean grain size and beach slope, give spatial continuity to beach observations, and repetitive sampling endows the areal patterns with continuity in time. Maps were made at intervals over a 3-year period on the same stretch of beach located upcoast from Point Mugu, California. These maps included open unimpeded segments and segments immediately upbeach and downbeach of an impermeable steel sheet piling groin. A rectangular foreshore grid, 100 by 125 feet on edge, with rows parallel to the waterline was used as a convenient mapping cell. Aggregate properties of the beach, such as bulk density, shear resistance, water content, and conventional textural and geometric attributes, were mapped from samples collected at the grid points. The mapped properties form a highly interlocked complex of foreshore responses to ongoing shore processes. The influence of foreshore erosion and deposition on these properties during successive tidal cycles was examined. The results show strong differences in some aggregate properties in erosional and depositional subareas. (Sims-ISWS)
W75-06218

A STUDY OF RHEOLOGIC PROPERTIES OF ESTUARIAL SEDIMENTS,
California Univ., Berkeley. Hydraulic Engineering Lab., and California Univ., Berkeley. Sanitary Engineering Research Lab.
R. B. Krone.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 313, $5.25 in paper copy, $2.25 in microfiche. Technical Bulletin No. 7, September 1963. 91 p, 38 fig, 10 tab, 14 ref. Contract DA-22-079-CIVENG-61-7.

Descriptors: *Sedimentology, *Mechanical properties, *Estuaries, *Sediments, Sediment transport, Viscosity, Measurement, Rheology, Physical properties, Particle size, Silts, Shear strength, Suspended solids, Sedimentation, Viscometers, Viscous flow, Instrumentation.

Sediments from deposits in several representative estuaries were examined for mineral content and particle size distribution, and were found to contain large amounts of clay minerals. The porosities and shear strengths of sediment aggregations were obtained from measurements of rheological properties of suspensions over a range of sediment concentrations and at varying shearing rates. An Ostwald-type capillary viscometer equipped with variable driving pressures was used for measurements at high shearing rates, and a concentric cylinder viscometer with a wide annular gap was constructed for measurements at low shearing rates. The shear strengths for primary aggregates, measured by using the capillary viscometer, were found to relate to the shear strengths of higher order floes, measured by using the concentric cylinder viscometer, when the character of the inter-aggregate contact was taken into consideration. (Sims-ISWS)
W75-06222

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
D. B. King, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 474, $4.75 in paper copy, $2.25 in microfiche. Technical Report No. 22, March 1974. 82 p, 34 fig, 28 ref. ONR Contract N00014-68-A-0173-0020.

Descriptors: *Inlets(Waterways), *Bays, *Tidal waters, Model studies, Water circulation, Tidal streams, Dynamics, Fluid mechanics, Hydraulics, Flow rates, Flow characteristics, Waves(Water), Sediment transport, Discharge(Water).

The equations for tidal flow through inlets into bays have been studied by many investigators. Perhaps the best known is the one by Keulegan in 1951. He considered nonlinear friction but assumed no inertia in the inlet, no river discharge, constant inlet cross section and bay surface area over a tidal cycle, and uniform bay elevation. These assumptions were analyzed in four models; an inertia model, a river discharge model, a changing area model, and a shallow water wave model; and their effects were predicted. The results were presented in graphical and equation form. They were then compared to real inlets and the limitations of each model were discussed. The models showed when certain conditions are sufficiently different for the Keulegan model to be inaccurate. For these conditions, the new models predict the more accurate results. (Sims-ISWS)
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

GEOMORPHOLOGY AND SEDIMENTS OF THE INNER NEW YORK BIGHT CONTINENTAL SHELF,
Coastal Engineering Research Center, Fort Belvoir, Va.
S. J. Williams, and D. B. Duane.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 577, $4.75 in paper copy, $2.25 in microfiche. Technical Memorandum 45, July 1974. 81 p, 22 fig, 6 tab, 68 ref, 2 append.

Descriptors: *Geomorphology, *Sediments, *Continental shelf, Sands, Coarse sediments, Seismic studies, Beaches, Estuaries, Topographic mapping, Topography, Oceanography, Geology, Bathymetry, Sludge disposal, New York, New Jersey.
Identifiers: *New York Bight, Sand sources, Beach nourishment.

Approximately 445 mi of continuous seismic reflection profiles and 61 vibrating cores were obtained from the Inner New York Bight which encompasses about 250 sq mi of the offshore from northern New Jersey and western Long Island. The major physiographic features include Sandy Hook and Rockaway Beach, both prograding barrier islands, Shrewsbury Rocks, and the Hudson (submarine) Channel. Shrewsbury Rocks mark the demarcation between two distinct geomorphic provinces. The area north of Shrewsbury Rocks is underlain by Coastal Plain strata which have been deeply eroded by Pleistocene glacial processes and covered by sand and gravel outwash. South of Shrewsbury Rocks, Coastal Plain strata have been evenly truncated and covered by a veneer of residual material. Cores reveal that fine to medium sand is the predominant sediment type on the inner shelf. Isolated patches of coarse sand and rounded pea gravels are present off Long Island where fluvial materials are exposed. Fine sand, silt, and muds comprise the sea floor at the head of the Hudson Channel and along the body. Sand suitable for beach nourishment projects is found in abundance throughout the shallow shelf parts of the Inner New York Bight. Sea floor topography is fairly flat and sand occurs as blanket deposits. It was estimated that over 2-billion cu yd of clean sand is available for retrieval by dredging. Comparison of bathymetric maps made from 1845 to 1970 confirmed that significant parts of the natural Hudson Channel have been filled from ocean disposal of up to 1-billion cu yd of assorted anthropogenic materials, from early construction in New York City and channel dredging within the estuaries and bays. (Sims-ISWS)
W75-06226

FORM-PROCESS RELATIONSHIPS ON ISLAND COASTS,
Louisiana State Univ., Baton Rouge. Coastal Studies Inst.
M. L. Hernandez-Avila, and H. H. Roberts.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 595, $4.75 in paper copy, $2.25 in microfiche. Technical Report 166, August 1974. 76 p, 23 fig, 37 tab, 30 ref. ONR Contract N00014-69-A-0211-0003.

Descriptors: *Islands, *Coasts, *Beaches, Geomorphology, Seashores, Bays, Swamps, Coastal marshes, Waves(Water), Ocean waves, Winds, Correlation analysis, Statistical methods.
Identifiers: *Form-process relationships, Lesser Antilles, Cliffs, Wave power distribution, Breaker-point wave power, Offshore slope.

Variations in geometric properties and spatial arrangement of major coastal morphologic landforms (beaches, cliffs, rocky shores, and swamps) of the islands of Barbados, Dominica, Grenada, St. Lucia, and St. Vincent were compared to coastal process sectors established by variations in mean wave power levels. Multivariate analysis of variance results indicated that the spatial arrangement of coastal morphologic landforms cannot be predicted from wave power distribution alone. Coastal landform classes do not exhibit distinguishing wave power levels. The main process-response parameter interaction was shown to be between breaker-point wave power and offshore slope, which are inversely correlated, especially

on cliffy and rocky coasts. Correlation analysis revealed that coastal geometric properties other than offshore slope steepness and morphologic landform width relate more to geomorphic and structural inheritance than to physical dynamic processes alone. The results of statistical and probabilistic analyses demonstrated the collective and individual contributions of geometric and process variables within the general context of two process-response conceptual models. A significant amount of the variability in geometric properties of the coastal morphologic landform units was attributed to wave power distribution patterns. (Sims-ISWS)
W75-06229

FLEXIBLE BREAKWATERS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 8B.
W75-06232

CURRENT MEASUREMENTS UNDER THE GULF STREAM NEAR CAPE HATTERAS, NORTH CAROLINA,
Rhode Island Univ., Kingston. Narragansett Marine Lab.
P. L. Richardson.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-781 283, $5.75 , $2.25 in microfiche. Technical Report 74-3, May 1974. 136 p, 24 fig, 10 tab, 68 ref, 10 append. ONR Contract N00014-68-A-0215-0003.

Descriptors: *Ocean currents, *Atlantic Ocean, Oceanography, Water circulation, Current meters, Currents(Water), Measurement, Velocity, Eddies, Temperature, Salinity, Silicates, *North Carolina.
Identifiers: *Gulf Stream, Western Boundary Undercurrent, *Cape Hatteras(NC), Gulf Stream countercurrent.

Measurements were made in the Gulf Stream and Western Boundary Undercurrent in order to determine how the two currents cross each other near Cape Hatteras, North Carolina. Deep current measurements were made along a line normal to the Gulf Stream axis and 100 m above the ocean floor in depths from 1300-4100 m. Six current meter records were obtained in May, June, and July 1971. Current velocities up to 47 cm/sec towards the southwest were recorded under the Gulf Stream axis. All six records had their peak velocities in the southwest quadrant and four of the deepest records (2800 to 4000 m) had their mean velocity vector in the southwest direction. During the period of observations the Gulf Stream did not extend to the bottom in this area except as brief current reversals to the northeast. The Western Boundary Undercurrent was flowing under the Gulf Stream and toward the southwest parallel to the bottom contours. The transport of the Undercurrent, estimated by two geostrophic velocity sections and deep current meter observations, was 24,000,000 cu m/sec. (Sims-ISWS)
W75-06233

A DIAGNOSTIC CALCULATION OF CONTINENTAL SHELF CIRCULATION,
Florida State Univ., Tallahassee. Dept. of Oceanography.
C-Y. Peng, and Y. Hsueh.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 740, $6.25 in paper copy, $2.25 in microfiche. Technical Report, August 1974. 150 p, 67 fig, 27 ref. ONR Contract N00014-67-A-0235-0002; NSF Grants GX-33502, GA-29734, GA-26563.

Descriptors: *Circulation, *Continental shelf, *Model studies, *Mathematical models, Oceanography, Coasts, Velocity, Currents(Water), Density, Mass transfer, Flow, Topography.
Identifiers: Baroclinicity, Coastal geometry.

An attempt was made to compute from observed density the three-dimensional velocity field in a continental shelf region that is bounded by the coast on one side and open to the ocean along the rest of its perimeter. The bottom topography of the shelf region was found to be of crucial importance. On the basis of the computed velocity field, it was shown that, in the presence of bottom topography, there is a release of potential energy in the density field to kinetic energy of the barotropic part of the motion. There also exists a kinetic energy exchange between the barotropic part and baroclinic part of the motion due to the work done by the bottom stress. (Sims-ISWS)
W75-06235

INTERDISTRIBUTARY BAY SEQUENCES AND THEIR GENESIS,
Oxford Univ. (England). Dept. of Geology and Mineralogy.
T. Elliott.
Sedimentology, Vol 21, No 4, p 611-622, November 1974. 5 fig, 36 ref.

Descriptors: *Bays, *Sedimentation, *Deltas, *Sedimentology, Tidal marshes, Coasts, Channels, Geomorphology, Geology, Deposition(Sediments), Avulsion, Flooding, Channel morphology, Sediments, Model studies, Mississippi River.
Identifiers: *Interdistributary bays, Alluvial ridges.

Interdistributary bay sedimentation is dominated by flood-generated incursions from the distributaries. There are three processes by which sediment-laden flood waters can be transferred to the bay: overbank flooding, crevassing, and avulsion. These processes combine to produce a family of sedimentary sequences, the majority of which are small-scale coarsening upwards sequences representing infilling of the bay. Subordinate related sequences include those of small-scale (crevasse) channels and larger scale (distributary) channels. Spits or beaches at the mouth of open interdistributary bays produce larger scale, wave-dominated coarsening upwards sequences. A model of bay sedimentation concerning a recently initiated (hypothetical) distributary was presented. Four phases of sedimentation (overbank flooding, crevasse splay, minor mouth bar--crevasse channel couplets and avulsion) characterize the history of the distributary, and it was postulated that the phases are genetically related to alluvial ridge development. (Sims-ISWS)
W75-06237

MARINE STUDIES OF SAN PEDRO BAY, CALIFORNIA. PART VI, CIRCULATION INVESTIGATIONS, CURRENT MEASUREMENTS IN THE OUTER LOS ANGELES HARBOR,
University of Southern California, Los Angeles. Allan Hancock Foundation.
K. S. Robinson, and H. Porath.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11558, $4.75 in paper copy, $2.25 in microfiche. Report USC-SG-7-74, July 1974. 91 p, 1 fig, 5 ref, 3 append.

Descriptors: *Water circulation, *Bays, *Harbors, Tidal effects, Measurement, Winds, Temperature, Circulation, Currents(Water), Current meters, Estuaries, *California.
Identifiers: *Los Angeles Harbor(Calif).

Surface currents in the Los Angeles Harbor were measured by three current meters. The main current producing forces appear to be tide and wind with the resulting current modified by the geometry of the basin. Current speeds were generally 0.1 to 0.2 knots at the surface and were more variable at stations near the outer breakwater than at stations near Terminal Island. A large counter-clockwise gyre was found during one period of observation, followed by a period of divergence in the same area one week later. Appendixes contain station locations; surface wind and current plots; and plots of tide, temperature, and current speed and direction. (Sims-ISWS)
W75-06245

APPLICATION OF MONOCHROMATIC OCEAN WAVE FORECASTS TO PREDICTION OF WAVE-INDUCED CURRENTS,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
L. R. Poole.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TND-7861. NASA Technical Note D-7861, February 1975. 26 p, 4 fig, 2 tab, 16 ref.

Descriptors: *Ocean currents, *Ocean waves, *Forecasting, *Winds, Currents(Water), Waves(Water), Water circulation, Oceanography, Forecasting.
Identifiers: Wave-induced currents, Wave spectra, Stokes' drift.

The use of monochromatic wind-wave forecasts in prediction of wind-wave-induced currents was assessed. Currents were computed for selected combinations of wind conditions by using a spectrum approach which was developed from the Bretschneider wave spectrum for partially developed wind seas. These currents were compared with currents computed by using the significant and average monochromatic wave parameters related to the Bretschneider spectrum. Results indicate that forecasts of significant wave parameters can be used to predict surface wind-wave-induced currents. Conversion of these parameters to average wave parameters can furnish reasonable estimates of subsurface current values. (Sims-ISWS)
W75-06246

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
For primary bibliographic entry see Field 2K.
W75-06247

FORMATION AND DEVELOPMENT OF BEACH CUSPS ON DEL MONTE BEACH, MONTEREY, CALIFORNIA,
Naval Postgraduate School, Monterey, Calif.
J. G. Bodie.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 376, $4.25 in paper copy, $2.25 in microfiche. Ms Thesis, September 1974. 66 p, 18 fig, 3 tab, 24 ref.

Descriptors: *Beaches, *Waves(Water), *Deposition(Sediments), Sands, Seashores, Bays, Surf, Ocean waves, Geomorphology, On-site investigations, *California, Regression analysis.
Identifiers: *Beach cusps, Beach morphology, Del Monte Beach(Calif), Monterey(Calif).

Observations and measurements were made daily on Del Monte Beach in order to develop a quantitative description of the parameters affecting the formation of beach cusps. Multiple regression techniques were used to formulate an equation relating cusp width to the measured parameters. The life cycle of cusps was studied in order to gain insight into the factors affecting the growth and decay of cusps. It was determined that cusps are depositional in nature and develop sequentially from preferential areas of accretion on the beach. Cusp spacing was found to be a function primarily of wave height (energy) and wave period. Regularity of the wave regime during formation was found to result in uniform cusp spacing. Little migration was observed in mature cusps, and large changes in the wave regime or beach conditions were required to alter the cusp profiles. The action of large wind waves, storm surges, and breakers

was observed to destroy beach cusps. (Sims-ISWS)
W75-06250

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
For primary bibliographic entry see Field 5C.
W75-06255

THE APPLICABILITY OF REGIME THEORY TO TIDAL WATERCOURSES,
University of Strathclyde, Glasgow (Scotland). Dept. of Civil Engineering.
A. G. Chantler.
Journal of Hydraulic Research, Vol 12, No 2, p 181-192, 1974. 5 fig, 1 tab, 16 ref, 1 append.

Descriptors: *Estuaries, *Tidal streams, *Channel morphology, *Discharge(Water), Width, Flow, Depth, Velocity, Regime, Hydraulics.
Identifiers: *Regime theory, *Hydraulic geometry, Characteristic flow, Tidal watercourses.

During the last fifty years, regime theory has become firmly established in the literature. Its popularity in civil engineering practice as a rational basis for the design of irrigation canals doubtless results from its simplicity and from its record of success when applied with discretion and within the limits of its derivation. Regime theory has also been shown to constitute a viable framework for the analysis of planimetric and sectional geometry of natural watercourses on both prototype and model scales. To date, most of the studies reported have been concerned with channels in which the flow is unidirectional and generally subject to natural hydrographs. The results of the re-analysis of all published and available supplemental data were presented. The investigation indicated, however, for tidal channel conventional regime, relations alone are insufficient to describe the longitudinal variation of hydraulic geometry. It was suggested that an end effect was responsible for channel enlargement beyond the widths required to convey the flow at each section. Evidence was presented to show that the mean velocity was constant at all sections along an estuary for a characteristic flow condition. Tidal channel cross sections undergo a natural vertical exaggeration in the landward direction. The graphs of breadth to depth ratio against discharge for certain estuaries (four out of the six for which the appropriate data was available), were coincident provided that the values were referred to those at a characteristic central point for each estuary. (Bhowmik-ISWS)
W75-06257

DEGLACIATION OF THE LABRADOR CONTINENTAL SHELF,
Bedford Inst., Dartmouth, (Nova Scotia). Atlantic Geoscience Center.
For primary bibliographic entry see Field 2C.
W75-06279

SOME CONSIDERATIONS OF STRAIGHTNESS IN CHANNEL FORM RELATING TO THE ESTUARY OF THE MACLENNAN RIVER, SOUTH OTAGO (NEW ZEALAND),
Newcastle Univ. (Australia). Dept. of Geography.
W. N. Jenks.
Journal of Hydrology, Vol 24, No 1/2, p 89-109, January 1975. 3 fig, 4 tab, 29 ref.

Descriptors: *Channel morphology, *Geomorphology, Alluvial channels, Regime, Graded, Hydraulics, Model studies, Estuaries, Tidal streams, Stochastic processes.
Identifiers: *New Zealand(Maclennan River).

Patterns of regular deviation about a mean downstream vector characterize many natural waterways. Straight channels are distinctive in that they do not deviate, and occur relatively infrequently. A specific instance of straightness occurring within the estuary of the Maclennan River was examined and some new concepts that may lead to a wider understanding of the general case were presented. Specifically, 19 morphometric and 2 hydraulic variables were measured and analyzed through 37 channel cross sections representing the entire tidal system. A subset of 10 cross sections represented the straight reach. A model was developed to describe change occurring through space, and by implication through time, within these 21 sets of variates. Stochastic processes were found to replace least probable normal distributions with most probable log-normal frequencies. Minimum variance and quasi-equilibrium conditions prevailed. At a wider level of reference, a study of tidal meanders occurring at the extremities of the tidal system was made. From this, the conclusion was reached that channel processes operating within these areas through the Late Holocene have expended fluvial and tidal energies, input at the ends of the system, in such a manner as to inhibit change within the straight reach. Finally, the hydraulic exponents associated with the rate of discharge at half-ebb were considered as potential indices of channel stability. In conclusion, the contemporary hydraulic theories of least work, minimum variance, and most probable channel form were supported. (Jess-ISWS)
W75-06285

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
For primary bibliographic entry see Field 4B.
W75-06296

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 6A.
W75-06299

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
For primary bibliographic entry see Field 7B.
W75-06316

NON-CONSERVATION OF HEAVY METALS IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. School of Oceanography.
For primary bibliographic entry see Field 5B.
W75-06325

3. WATER SUPPLY AUGMENTATION AND CONSERVATION

3A. Saline Water Conversion

REVERSE OSMOSIS WATER PURIFYING SYSTEM FOR HOUSEHOLD USE,
For primary bibliographic entry see Field 5F.
W75-05891

WATER DISTILLATION APPARATUS,
Oral Corp., Boca Raton, Fla. (assignee)
For primary bibliographic entry see Field 5F.
W75-05893

PROCESS FOR PRODUCING AND MAINTAINING PURIFIED, STERILE WATER,
Secretary of the Interior, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5D.
W75-05904

ION EXCHANGE WASTE WATER TREATMENT PROCESS,
Combustion Engineering, Inc., Windsor, Conn. (assignee)
For primary bibliographic entry see Field 5D.
W75-05906

THE DESALINATION OF SEAWATER BY THE USE OF NUCLEAR ENERGY,
Atomic Energy Establishment, Winfrith (England).
F. C. Wood.
Available from the National Technical Information Service, Springfield, Va 22161 as AEEW M-1261, $4.00 in paper copy, $2.25 in microfiche. Paper to the 3rd National Conference on Heat and Nuclear Energy Problems of the Bulgarian Peoples Republic, Varna (Bulgaria), May 28-June 2, 1974. 16 p, 4 fig, 3 tab, 8 ref.

Descriptors: *Desalination, *Desalination processes, *Nuclear powerplants, Desalination plants, Desalination apparatus, Membranes, Semipermeable membranes, Separation techniques, Reverse osmosis, Freezing, Flash distillation, Nuclear energy, Powerplants.

Although present needs are low, growing demands in industrialized countries for power and water will ultimately lead to the use of nuclear reactors to satisfy both requirements. Desalination processes are required which are capable of utilizing the high grade of energy produced by commercial power reactors in the form of mechanical work rather than as low grade heat. Vapor compression evaporation in hybrid and variable purpose plants will probably be the first such process to be developed, although pure power-using processes such as reverse osmosis and freezing may be the ultimate solution. (Sims-ISWS)
W75-06224

3B. Water Yield Improvement

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
R. J. Rutherford, and G. L. Byers.
Canadian Agricultural Engineering, Vol 15, No 1, p 9-11, June, 1973. 1 fig, 2 tab, 8 ref. OWRT A-015-NH(4).

Descriptors: *Evaporation, *Evaporation control, Water loss, Consumptive use, Evapotranspiration, Chemcontrol, Monomolecular films, Thin films, Water conservation, Wetlands, *New Hampshire, Ponds, Water yield improvement, *Retardants.
Identifiers: Jewell Pond(NH).

Evapotranspiration from the muck and peat bog of Jewell Pond in Stratham, New Hampshire, was 1.7 times as great as the evaporation from the open water surface during the summer of 1969. The wetland released 16.9 centimeters of water from storage during the same period. During the summer of 1970, an evaporation retardant was used to reduce open water evaporation. The objective of this management practice was to increase water yields and augment water supplied during dry months. The retardant successfully reduced evaporation by 47 percent. Additional water supplies obtained by the use of evaporation retardants could be used for domestic and commercial consumption. (Skogerboe-Colorado State)
W75-06095

CONSERVING WETLAND WATER BY SUPPRESSING EVAPORATION,
New Hampshire Univ., Durham. Water Resources Research Center.
R. J. Rutherford, and G. L. Byers.
Canadian Agricultural Engineering, Vol 15, No 1, p 9-11, June 1973. 1 fig, 2 tab, 8 ref. OWRT A-015-NH(4).

Descriptors: *Water yield improvement, *Wetlands, Evaporation, Conservation, Management, Water supply, Water balance, Evapotranspiration, Vegetation, Retardants, On-site data collections, Meteorology, Equations.
Identifiers: *Evaporation suppression.

The management technique of evaporation suppression on wetlands to increase water yields and augment water supplies during dry months was investigated. Also, the role of wetlands in water storage was evaluated. The site selected for study was a 10.9 acre wetland located in the town of Stratham, New Hampshire. Only 2.7 acres were open water surface. The remaining 8.2 acres consisted of muck and peat deposits supporting a dense growth of buttonbush. Meteorological data were collected and tabulated as well as pond level records. Surface runoff was insignificant and net groundwater flow was assumed to be constant from year to year. Data obtained during 1969 were tabulated and found comparable with similar projects in Wyoming and Minnesota. The second portion of the study was carried on in the summer of 1970 when an evaporation retardant (Octahexadecanol) was applied to the open water and reduced evaporation by 47%. The project had implications for both flood control and public water supply. (Roberts-ISWS)
W75-06121

BASES OF METHOD AND MEANS OF MODIFICATION OF HAIL PROCESSES,
Zakavkazskii Nauchno-Issledovatelskii Gidrometeorologicheskii Institut, Tiflis (USSR).
I. T. Bartishvili, I. I. Gayvoronskiy, A. I. Kartsivadze, and G. K. Sulakvelidze.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-778 557, $3.75 in paper copy, $2.25 in microfiche. Air Force Systems Command Foreign Technology Division, Report No. FTD-MT-24-212-74, April 1974. 26 p, 2 tab, 1 ref. Translated from Trudy V Vsesoyuznogo Meteorologicheskogo S'yezda Sektsiya Aktivnykh Vozdeystviy Na Atmosfernyye Protsessy, Vol 4, p 3-22, 197

Descriptors: *Hail, *Weather modification, Meteorology, Precipitation(Atmospheric), Storms, Clouds, Cloud physics.
Identifiers: *USSR.

Research on the process of the formation of hail for the purpose of the development of methods of combating hail damage were initiated in 1953 in the Institute of Geophysics of the Georgian Academy of Sciences; subsequently, these investigations were carried out also in the High-Altitude Institute of Geophysics, the Transcaucasian Scientific Research Hydrometeorological Institute, and the Central Aerological Observatory. Some of the work done in the modification of hail by these groups was reviewed. A bibliography, mostly in Russian, listing reports and publications on the Russian hail modification work was included. (Sims-ISWS)
W75-06126

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.
W75-06179

3D. Conservation In Domestic and Municipal Use

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
For primary bibliographic entry see Field 8C.
W75-05909

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
J. F. Riccio, and C. A. Gazzier.
Available for $1.00 from Geological Survey of Alabama, University. Available also from the National Technical Information Service, Springfield, Va 22161 as PB-240 851, $3.75 in paper copy, and $2.25 in microfiche. Alabama Geological Survey Circular 92, 39 p, 1973. 15 fig, 3 tab, 14 ref. OWRT B-038-ALA(1), B-032-ALA(1). 14-31-0001-3553.

Descriptors: *Water supply, *History, Potable water, *Alabama, *Water sources, *Industrial water, *Domestic water, Water resources development, Surface water, Groundwater, Cities.
Identifiers: Geoarchaelogy, *Mobile(Ala), Big Creek Lake(Ala).

The histroy of water supply of the greater Mobile area is traced from its initial beginnings with the French settlement on Dauphin Island through the Subsequent French, British, Spanish and American occupations of the city of Mobile and its environs. Surface water from local streams and shallow ground water were utilized as a source of potable water supply by the colonists and later settlers. The Mobile Water Service System is the result of acquistion by the city of Mobile of the water rights of the Stein Water Works in 1898 and the Bienville Water Supply Company in 1907. Mobile's principal source of domestic and industrial water is the 3,600-acre Big Creek Lake completed in 1952. An additional source of industrial water is the Mobile River and Cold Creek, a tributary thereof. The principal sustained yield of both the surface- and ground-water resources of the area is approximately 11.84 billion gallons per day. Total water resources of the area, therefore, greatly exceed water demands of the foreseeable future.
W75-06071

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
For primary bibliographic entry see Field 4B.
W75-06072

PEAK RATIOS AND ALTERNATE MODEL FACTORS FOR RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez.
For primary bibliographic entry see Field 6D.
W75-06085

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-06102

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

3E. Conservation In Industry

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
For primary bibliographic entry see Field 5D.
W75-06320

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
For primary bibliographic entry see Field 5G.
W75-06322

MORE LIFE FOR DIAPHRAGM CELLS.
For primary bibliographic entry see Field 5G.
W75-06324

3F. Conservation In Agriculture

AGROMETEOROLOGICAL FORECASTING, AN IMPORTANT MEANS FOR DECISION MAKING IN AGRICULTURE (IN FRENCH),
Institutul de Meteorologie si Hidrologie, Bucharest (Rumania).
For primary bibliographic entry see Field 2B.
W75-05855

DRIP IRRIGATION METHOD,
South Australia Rubber Mills Pty. Ltd. (Australia). (assignee)
A. J. Brock, and D. W. Fulton.
U.S. Patent No. 3,849,639, 4 p, 5 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1304, November 19,1974.

Descriptors: *Patents, *Irrigation system, *Water distribution(Applied), *Water conservation, Equipment, Irrigation engineering, Efficiencies.
Identifiers: *Drip irrigation.

A drip irrigation system has a main supply pipe; a secondary distribution pipe; joining means joining the secondary distribution pipe to the main supply pipe and placing it in liquid flow communication with the main supply pipe; a series of aperatures in the wall of and spaced from one another along the secondary distribution pipe; and a corresponding series of capillary tubes of coil shape. The capillary tubes have a greater diameter than the respective apertures of the series extending through those apertures and sealably retained by the resilient deformation of the wall of the secondary

distribution pipe. The method of installing the system over an area of land comprises the steps: joining a secondary distribution pipe to a main supply pipe for liquid flow; piercing the wall of the secondary distribution pipe to form a series of apertures; winding a series of capillary tubes onto formers, heating the capillary tubes to a sufficient temperature and for sufficient time that they retain a coil shape after removal from the formers, the outer diameter of the capillary tubes exceeds the diameter of the pierced apertures; removing the capillary tubes from the formers, and cutting lengths from the capillary tubes and inserting tube of each cut length through a respective pierced aperture. (Sinha-OEIS)
W75-05885

IRRIGATION SYSTEM,
P. Niederwemmer.
U.S. Patent No. 3,849,991, 5 p, 15 fig, 16 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Irrigation systems, *Subsurface irrigation, *Soil management, *Water purification, Water table, Desalination, Ditches.

The subsurface and surface flooding irrigation procedure is characterized by the creation of an artificial ground water table at a depth of about 0.7-1.00 m, i.e., beneath the root zone. A continuous supply of water is available to the plant roots at a soil level at which the oxygen required for root development is easily available to the plants. The surface of the soil remains dry, thus reducing evaporation considerably and unproductive water loss is largely eliminated in the system. The subsurface and water trapping irrigation system consists of the following components: 'Main afferent ditches' bring the water from a canal, river, lake or from a pumping station. 'Field afferent ditches and/or field dispersion ditches' take the water brought by the main afferent ditches and direct it through 'slide valves' which regulate the volume of flow and on into the underground irrigation lines. The slide valves are also so installed that they can trap the water in the lines when closed. The 'underground irrigation line' consists of a trough-shaped barrier layer, which can be made of various materials such as resistant plastic foils, asphalt or bitumen emulsions, or artificial or natural fabric strips; and, in addition, can be covered with various materials. The subsurface barrier layers are laid in parallel from the field afferent ditches in such a way that the two upper edges of the trough lie beneath the limit of soil cultivation. The barrier layers are not laid continuously but at intervals. (Sinha-OEIS)
W75-05887

AUTOMATIC IRRIGATION APPARATUS,
E. A. Platt.
U.S. Patent No. 3,860,172, 5 p, 4 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 744, January 14, 1975.

Descriptors: *Patents, *Irrigation systems, *Surface irrigation, *Irrigation efficiency, Agriculture, Conservation, Ditches, Water delivery, Automation.
Identifiers: *Automatic irrigation equipment.

The apparatus consists of an elongated bag of a flexible, water impervious material adapted to collect a generally continuous flow of water until the bag contains a predetermined volume of water. One end of the bag is provided with a discharge arrangement in the form of a support platform which normally maintains the end of the bag at a selected elevation representative of the desired predetermined volume. The positioning of the platform is controlled by a weight biasing means which is overcome by the static pressure of the water within the bag. When the predetermined volume of water in the bag is reached the bag end is lowered and the volume of water is discharged into an irrigation ditch system. The water is automatically discharged into the irrigation system at time intervals dependent upon the rate of flow of water into the bag. (Sinha-OEIS)
W75-05901

DRIP IRRIGATION,
E. N. Costa.
U.S. Patent No. 3,860,179, 5 p, 11 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 747, January 14, 1975.

Descriptors: *Patents, *Irrigation systems, *Conduits, *Turbulent flow, Equipment, Application equipment.
Identifiers: *Drip irrigation.

A combined flow and discharge fitting for a continuous drip irrigation system comprises a flow conduit having at least one capillary tube partially embedded in the wall of the flow conduit. The method of continuous drip irrigation includes the step of discharging water drop-wise from a flow conduit via a number of spaced capillary tubes. At least some of the capillary tubes have different effective lengths to compensate for differences in internal pressure in the conduit, and to permit turbulent flow rates to be used in the conduit. (Sinha-OEIS)
W75-05902

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
For primary bibliographic entry see Field 5G.
W75-06078

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4D.
W75-06079

OPTIMIZATION OF WATER USE EFFICIENCY THROUGH TRICKLE IRRIGATION AND THE STRESS DAY INDEX,
Texas A and M Univ., College Station. Water Resources Inst.
E. A. Hiler, and T. A. Howell.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 821, $7.50 in paper copy, $2.25 in microfiche. Technical Report No. 62, December 1974. 229 p, 30 fig, 26 tab, 109 ref, 2 append. OWRT A-024-TEX(1). 14-31-0001-3844 and 4044.

Descriptors: Irrigation, Systems analysis, Dynamic programming, Water utilization, Irrigation efficiency, Sorghum, Optimization, Crop production, Crop response, Growth rates, Model studies.
Identifiers: Trickle irrigation.

Effects were evaluated of high frequency irrigation on grain sorghum growth and yield and guidelines were developed for the optimal utilization of a scarce resource--water--under high frequency irrigation. An experiment was conducted in fully instrumented field lysimeters which had undisturbed soil cores. Rainfall was eliminated as a variable by an automated movable shelter which protected the lysimeters from rain. Soil and crop measurements included soil water content, leaf temperature, leaf resistance, leaf water potential, leaf area index, and crop height. Wind speed, air temperature, dew-point temperature, and net radiation were measured above the crop. Yield and water use efficiency of grain sorghum under high frequency irrigation were decreased most by water deficits occurring during the boot-to-bloom period. Yield models of the multiplicative- and additive-type were compared to the yield data. Within the range of the data, each model was an acceptable representation of the actual results of independent experiments. Environmental and soil water balance models were also developed and tested. Stochastic dynamic programming was used to maximize the expected yield per unit of available irrigation water. The results indicated that irrigation requirements could be reduced by almost one-half without appreciable loss in yield if the irrigation water was supplied optimally throughout the season. Also, pre-irrigation (irrigation at or prior to germination) was preferred to using a like-amount of water, supplied optimally later in the season. This research demonstrated the potential of high frequency irrigation to improve water use efficiency. Application of operations research techniques greatly enhanced the irrigation decision selection under uncertain outcomes.
W75-06089

THE COLORADO: A WEARY RIVER,
For primary bibliographic entry see Field 4A.
W75-06100

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

FIELD TEST OF A MODIFIED NUMERICAL MODEL FOR WATER UPTAKE BY ROOT SYSTEMS,
Agricultural Research Organization, Bet-Dagan (Israel). Inst. of Soils and Water.
For primary bibliographic entry see Field 2I.
W75-06265

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 4A.
W75-06273

EFFECTS OF PLANT DENSITY, IRRIGATION AND POTASSIUM AND SODIUM FERTILIZERS ON SUGAR BEET: II. INFLUENCE OF SOIL MOISTURE AND WEATHER,
Broom's Barn Experiment Station, Bury St. Edmonds (England).
For primary bibliographic entry see Field 2I.
W75-06317

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
For primary bibliographic entry see Field 6A.
W75-06328

USING POULTRY LITTER, IRRIGATION AND TALL FESCUE FOR NO-TILL CORN PRODUCTION,
Agricultural Research Service, Athens, Ga.
J. R. Carreker, S. R. Wilkinson, J. E. Box, Jr., R. N. Dawson, and E. R. Beaty.
J Environ Qual. Vol 2, No 4, p 497-500, 1973, Illus.

Descriptors: *Irrigation effects, *Litter, Corn, Crop production, Fescues, Cultivation.
Identifiers: Poultry filter, No-tillage.

A cropping system is needed in the Southern Piedmont (USA) and related areas for increasing production of grain and forage, controlling erosion, and providing a place for safe utilization of poultry litter. No-till corn (Zea mays L.) production in tall fescue (Festuca arundinacea Schreb.) appears to offer such a system. Corn was no-till

planted and irrigated in live sod and in sod that was killed with 2.2 and 0.28 kg/ha atrazine and paraquat, respectively. N, P, K, and lime applied uniformly to all treatments included 145, 98, 185, and 3,330 kg/ha in 1970 and 145, 138, 323, and 3,330 kg/ha in 1971, respectively. Subplot treatments were 5.6, 11.2, 22.4 and 44.8 metric tons/ha poultry litter, and 335 kg/ha N. Measurements with electrical resistance blocks showed that soil-water content under the corn was never below 50% of the water between field capacity and wilting point. Corn population was higher and yields are better in the killed sod than in live sod both years. Yield in the killed sod were very satisfactory with 9500 kg/ha (15.3 bu/acre) from 5.6 metric tons/ha poultry litter plus 145 kg/ha N and 12,960 kg/ha (207 bu/acre) from 480 kg/ha N. Tall fescue present in the live sod after corn harvest was above 2000 kg/ha in 1970 and above 6000 kg/ha in 1971. Dead grass plus poultry litter residues after killed sod in 1970 ranged from 6360 kg/ha with N only to 30,200 kg/ha with 44.8 metric tons/ha poultry litter. Poultry litter provides a vast resource of plant nutrients. No-till corn in tall fescue with irrigation and poultry litter will produce needed grain, conserve soil and water, and turn a waste product into a resource. --Copyright 1974, Biological Abstracts, Inc.
W75-06348

4. WATER QUANTITY MANAGEMENT AND CONTROL

4A. Control Of Water On The Surface

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
D. I. Navon, and H. W. Anderson.
In: Proceedings of the Joint FAO/U.S.S.R. International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970. Food and Agricultural Organization, United Nations, (Rome), p 359-368, 1972. 29 ref.

Descriptors: *Forest management, Water resources, *Flood control, *Sediment control, *Deposition(Sediment), *Lumbering, *Planning, Systems analysis, Linear programming, Economics, Social values, *Ecosystems.
Identifiers: Multivariate analysis, Social goals.

To plan the management of wildland resources requires the use of basic scientific knowledge and modern mathematical techniques in the context of social goals and institutions. Some of the most helpful techniques in carrying out this task include multivariate regression, factor analysis, and mathematical programming. With multivariate and factor analysis, statistical relations can be identified in the complex of physical, social and economic variables which make up the management system. The use of these techniques is illustrated in developing rational and efficient decisions in planning the management of water and other resources. An example is given of the system and the models developed to evaluate intense fire protection in the mountains of southern California, through their effects on floods and sedimentation. The system involved a vegetation index of management, a precipitation index of time variation, and geologic and vegetation indexes of spatial variation within mountain watersheds. By characterizing the management process as discrete treatment-response phenomena, mathematical programming techniques can be used to generate and evaluate management plans consisting of combinations of these treatments. While the ultimate goal of planning is to generate a plan maximizing social welfare, in practice it is only possible to generate alternative plans which are consistent with social goals and which optimize some measurable index of performance. The selection of a particular plan must be left to human judgment. The use of modern techniques in the planning process provides sound premises for this choice by generating efficient management alternatives expressed in terms of measurable inputs and outputs. (See also W75-05912) (Forest Service)
W75-05915

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05916

ROOT DISTRIBUTION UNDER SOME FOREST TYPES NATIVE TO WEST VIRGINIA,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2I.
W75-05933

PIPELINES IN FORESTED WETLANDS: CROSS DRAINAGE NEEDED TO PREVENT TIMBER DAMAGE,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05939

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
For primary bibliographic entry see Field 6B.
W75-05952

PATTERNS OF VARIATION IN A FLUVIAL SYSTEM,
State Univ. of New York, Buffalo. Dept. of Geography.
For primary bibliographic entry see Field 2J.
W75-05961

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand. 518 p, 1973. Proceedings in 4 vols.

Descriptors: *Conferences, *Floods, *Sediment transport, *Sediment discharge, *Flood discharge, *Flood control, *Flood damage, *Warning systems, Measurement, Peak discharge, Velocity, Flood frequency, Gaging, Bed load, Sampling, Reservoirs, Flood forecasting, Rivers, Watersheds(Basins), Channels, Flood flow, Flow rates, Dams, Multiple-purpose projects, Flood protection, Foreign countries, Hydrology, Small watersheds.
Identifiers: *River mechanics.

River mechanics was discussed at a symposium held at Bangkok in 1973. The three broad topics discussed in Volume 2 were: (1) flow and sediment measurement; (2) flood computation; and (3) flood damage, warning, and control. (See W75-05974 thru W75-06014) (Humphreys-ISWS)
W75-05973

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 8B.
W75-05974

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
J. Martinec.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, p 25-35, 1973. 5 fig, 3 tab, 6 ref.

Descriptors: *Stage-discharge relations, *Discharge measurement, *Roughness(Hydraulic), *Flow measurement, *Rating curves, *Velocity, Roughness coefficient, Flood stages, Flow rates, Flood data, Cross-sections, Channels, Rivers, Alluvial channels.
Identifiers: *Stage extrapolation.

Principles of computing and extending discharge rating curves were outlined by using experimental material measured on characteristic rivers in 1954-1971. The performance of velocity formulas in a broad range of the relative roughness of river channels was assessed. Changes of the roughness in relation to discharge were examined. Examples showed a reduction of the channel capacity to 50% by ripple formation at high water stages and an opposite trend of the effective roughness in an irregular channel. It was concluded that in alluvial streams a deterioration of flow conditions with the rising stage can be expected. (See also W75-05973) (Terstriep-ISWS)
W75-05976

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
For primary bibliographic entry see Field 8B.
W75-05977

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2J.
W75-05978

RELIABILITY OF BED-LOAD SAMPLING,
Research Inst. for Water Resources Development, Dudapest (Hungary). Dept. of Surface Waters.
For primary bibliographic entry see Field 2J.
W75-05979

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-05980

COMPUTING FLOOD FREQUENCY IN THE HUMID EASTERN USA,
Pennsylvania State Univ., University Park. Dept. of Civil Engineering.
B. M. Reich.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 121-132. (1973) 10 fig, 16 ref.

Descriptors: *Flood frequency, *Watersheds(Basins), *Design flood, *Pennsylvania, Hydrologic aspects, Peak

discharge, Flood recurrence interval, Flood peak, Statistical methods, Annual flood, Frequency, Storm runoff, Topography, Precipitation(Atmospheric), Rainfall, Humid areas,
Identifiers: Ungaged watersheds.

Hydraulic designs, estimates of sediment transport, or channel stability are based on hydrologic estimates of large floods. A short method for predicting design floods on ungaged water sheds in the 40 to 48 inch year-round precipitation in Pennsylvania was presented. Its development from stream gage records was discussed. Relationships of flood peaks to landscape and climate features were sought. Various stratifications were tried in the hope of finding homogeneous subsets possessing strong predictive relationships. For instance the coefficient of determination (sq R) for the Piedmont subset reached 0.94 in comparison to the multi-state's subsets' 0.87. Similarly elimination of 18 from the original 61 Ohio watersheds in the Appalachian Plateau subset increased sq R from 0.85 to 0.89. The resulting equations involve area to the powers of 0.71, 0.74, and 0.81. In the Piedmont, one equation also requires multiplication by about the fourth power of the daily maximum rainfall of 2.33 year return period. Cavernous limestone was shown to reduce the mean annual flood to as little as 40% of an otherwise similar watershed on other rocks' estimate. Glaciation in the northwest decreased floods to about 2/3 of their size in the unglaciated Appalachian Plateau, but is associated with increased floods in the east. Long return period estimates were made simply by multiplying the mean annual value by 2 for 10 years, or 3 for 50 years, etc. Derivation of a typical regional dimensionless Gumbel frequency-line was presented. (See also W75-05973) (Humphreys-ISWS)
W75-05981

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
E. M. Laurenson.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 133-146. (1973) 7 fig, 1 tab, 2 ref.

Descriptors: *Flood frequency, *Watersheds(Basins), *Dams, *Analytical techniques, Analysis, Probability, Flood forecasting, Flood peak, Hydrographs, Annual flood, Streamflow, Flood routing, Storage, Statistical methods, Flood control.
Identifiers: Flood frequency routing.

Construction of a storage dam on a river normally reduces the magnitude of the flood of any given frequency downstream. The reduction is greatest close to the dam and diminishes in the downstream direction. Methods were presented for estimating the change in the flood frequency curve at various points downstream of the dam. Separate procedures were required to account for the effects of the dam itself and of tributary streams, channel storage, and effluent streams. (See also W75-05973) (Humphreys-ISWS)
W75-05982

A GENERAL FORMULA FOR DETERMINATION OF PEAK FLOOD,
Madhya Pradesh Irrigation Dept., Bhopal (India).
S. R. L. Gupta.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 147-158. (1973) 8 fig, 3 tab, 4 ref.

Descriptors: *Flood peak, *Watersheds(Basins), *Methodology, Runoff, Precipitation(Atmospheric), Frequency, Equations, Analytical techniques, Floods, Discharge(Water), Drainage area, Large watersheds, Storage, Valleys, Shape, Slopes.
Identifiers: India.

A general formula suggested for determining peak flood discharge was developed from watersheds ranging in size from 5.2 to 195.5 square miles. Factors taken into account for formula development included: (1) precipitation - its return period, and distribution in time and space; (2) the shape, slope, rugosity, nature, and size of catchment area; and (3) the valley storage. Nomograms were presented as aids for solving the formula. (See also W75-05973) (Humphreys-ISWS)
W75-05983

FLOOD COMPUTATIONS FOR THE HAWAIIAN ISLANDS,
Hawaii Univ., Honolulu. Dept. of Civil Engineering.
Y.-S. Fok, and L. S. Lau.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 159-169. (1973) 16 ref.

Descriptors: *Flood discharge, *Hawaii, *Watersheds(Basins), *Analytical techniques, Peak discharge, Runoff, Flood frequency, Design flood, Statistical methods, Regression analysis, Correlation analysis, Rational formula, Hydrograph analysis, Unit hydrographs, Model studies.

In the Hawaiian islands, because of the characteristic steep and small watersheds and the extraordinarily intense storms, severe floods may occur without warning. Due to lack of uniformity in the design criteria, various flood determination methods have been used by governmental agencies and private consulting firms for the determination of design peak discharges. Flood computational methods used include rational, envelope curve (from maximum peak discharges of all stream gages), flood frequency, standard project flood, and hydrograph synthesis methods. Other computational methods developed from research studies include multiple regression, multiple correlation, and instantaneous unit hydrograph analysis. Flood hydrology research efforts at present are partly focused on modification of the Stanford Watershed Model to develop hydrologic simulation techniques for use in Hawaiian islands and on evaluation of the characteristics of the instantaneous unit hydrograph based on the water budget method. (See also W75-05973) (Humphreys-ISWS)
W75-05984

A TYPHOON FLOOD COMPUTATION MODEL IN TAIWAN,
National Taiwan Univ., Taipei. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05985

DESIGN PEAK FLOOD COMPUTATION FOR MAJOR AND MULTIPURPOSE RESERVOIRS ON NARMADA RIVER,
Madhya Pradesh Irrigation Dept., Bhopal (India).
L. A. Panjwani.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 183-193. (1973) 3 fig, 2 tab, 7 ref.

Descriptors: *Design flood, *Large watersheds, *Unit hydrographs, *Multiple-purpose reservoirs, Flood peak, Flood discharge, Analysis, Methodology, Maximum probable flood, Hydrographs, Floods, Reservoirs.
Identifiers: *India(Narmada River).

Eleven major and multipurpose reservoirs are envisaged for construction on the Narmada River in central India. Among these, Bargi and Narmadasagar are the two key reservoirs. The unit hydrograph approach for design peak flood computation, despite certain obvious drawbacks and limitations when applied to large drainage basins, has wide acceptance among Indian engineers. The unit hydrograph methodology adopted for computation of design peak flood for these two reservoirs was described. The impact of floods passing through these two reservoirs on the other proposed reservoirs downstream was also described. (See also W75-05973) (Humphreys-ISWS)
W75-05986

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 2E.
W75-05987

STOCHASTIC APPROACH TO LINEAR AND NONLINEAR RUNOFF ANALYSIS,
Tokyo Inst. of Tech. (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05988

FLOOD PREDICTION - A BAYESIAN APPROACH,
West Virginia Inst. of Tech., Montgomery. Dept. of Civil Engineering.
A. S. Paintal.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 221-228. (1973) 1 fig, 2 ref.

Descriptors: *Flood forecasting, *Statistical methods, *Probability, Estimating, Floods, Flood recurrence interval, Frequency, Risks, Hydrology.
Identifiers: *Poisson probability, *Bayesian probability.

A method was described for predicting the Probability of occurance of 'critical' flood at a site from limited data by using Poisson probability and Bayesian probability concepts. An expression was developed for computing the probability of observing r sub o number of critical floods in t sub o number of years, having observed r number of floods in t number of years. The Bayesian development was used to yield a forecast of the probability of finding time equal to or less than t sub o to next flood occurance if r number of floods have been observed in t number of years. The Bayesian forecasts reflects the influence of information and could be used in a statistical decision theory context to optimise hydrologic design decisions. (See also W75-05973) (Humphreys-ISWS)
W75-05989

SOME ASPECTS FOR THE SELECTION OF AN ADEQUATE PROBABILITY DISTRIBUTION FUNCTION FOR FLOOD ANALYSIS,
Karlsruhe Univ. (West Germany). Theodor-Rehbock Lab. for River Improvement.
D. Koberg, and H. Eggers.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 229-239. (1973) 2 fig, 4 ref.

Descriptors: *Flood forecasting, *Annual flood, *Statistical methods, Probability, Flood recur-

rence interval, Flood peak, Hydrology, Floods, Analysis, Data collections.
Identifiers: *Probability distribution functions, Likelihood ratio test, Chi-square test, Kolmogoroff test.

Annual flood peaks are considered as a simple random variate repeated independently each year. Estimation of a flow of given return period involves the decision according to which probability function flood peaks are distributed. This process of decision was discussed in detail, especially aspects of the investigator's personal influence on the results. An example based on 31 samples was given to show these influences. The likelihood ratio test was recommended as the perferable procedure in deciding on the distribution of a random variate. (See also W75-05973) (Humphreys-ISWS)
W75-05990

UNIT HYDROGRAPHS AND STATISTICAL DENSITY FUNCTIONS,
Victoria State Rivers and Water Supply Commission, Melbourne (Australia).
For primary bibliographic entry see Field 2E.
W75-05991

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
R. D. Verma, and R. M. Advani.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 253-264. (1973) 1 tab, 37 ref.

Descriptors: *Flood discharge, *Watersheds(Basins), *Reviews, *Forecasting, Runoff forecasting, Methodology, Peak discharge, Hydrographs, Systems analysis, Precipitation excess, Unit hydrographs, Hydrograph analysis, Flood routing, Rational formula, Estimating, Maximum probable flood.
Identifiers: *Ungaged watersheds.

The various important methods available in the literature for the estimation of flood discharges for catchments with no stream flow data were reviewed. This review indicated that little is known for the estimation of rainfall excess. A number of physical models, systems analysis models, and system synthesis models are available to predict the response of a catchment to rainfall excess. However, because a number of parameters are involved, these models are quite complicated to use for practical problems. Although considerable research was done during the last decade for the estimation of flood discharge, the problem still remains unsolved for ungaged natural catchments. However the methods of storage routing and streamflow synthesis seem to be the most promising. There is a need to develop better methods for accurate estimation of rainfall excess and for determination of critical parameters for a catchment. (See also W75-05973) (Humphreys-ISWS)
W75-05992

FLOOD COMPUTATIONS FOR NONUNIFORM RAINFALL DISTRIBUTION,
Indian Inst. of Tech., New Delhi. Dept. of Applied Mechanics.
For primary bibliographic entry see Field 2A.
W75-05993

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
V. Klemes.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 277-289. (1973) 5 fig.

Descriptors: *Flood control, *Flood forecasting, *Cost-benefit analysis, *Reservoir operation, Flood protection, Flood routing, Reservoir design, Reservoir storage, Reservoirs, Storage capacity, Optimization, Flood damage, Hydrology.
Identifiers: *Flow reduction, *Optimum forecast, Single purpose reservoir.

The increase of benefits due to runoff forecast was studied for the operation of a single flood-control reservoir. It was shown that, for a given forecast period, the benefit derived from the forecast increases with reservoir storage capacity up to a certain point beyond which the reverse is true. This indicates that for a given type of forecast there is always a unique storage capacity for which the benefit reaches a maximum. The optimum forecast period for a flood-control reservoir of a given capacity was found by introducing a cost function. (See also W75-05973) (Terstriep-ISWS)
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
E. Mosonyi, W. Buck, and W. Kiefer.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulc Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 291-302. (1973) 6 fig, 2 tab, 4 ref.

Descriptors: *Flood protection, *Flood damage, *Economics, *Cost comparisons, River training, Flood control, Detention reservoirs, Land use, Agriculture, Buildings, Design flood, Floods, Flood data, Evaluation, Methodology, Costs, Optimization.

The methodology of optimization of flood protection measures, exemplified by a selected small river valley in the Black Forest was studied. Unit damages for agricultural losses were determined for pastures and for grain land and were differentiated for every season. Unit damages for buildings were based on data received from an insurance company that insures buildings against floods. Damages caused by floods and costs for flood control structures were compared for various design floods and two types of flood protection measures (river training and reservoirs). It was shown that in such cases river training measures are not economically feasible, but construction of small reservoirs is justified. (See also W75-05973) (Humphreys-ISWS)
W75-05995

FLOOD CONTROL IN THE PLAIN RIVERS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
For primary bibliographic entry see Field 4D.
W75-05996

BENEFIT-ESTIMATE OF DRAINAGE AND FLOOD-CONTROL WORKS IN SMALL WATERSHEDS OF SEMI-ARID CLIMATE,
Technion-Israel Inst. of Tech., Haifa.
For primary bibliographic entry see Field 6B.
W75-05997

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 4D.
W75-05998

A STUDY OF THE PERAK RIVER FLOOD OF JANUARY 1967 AND AN EVALUATION OF THE FLOOD CONTROL ASPECTS OF TEMENGOR RESERVOIR,
Shawinigan Engineering Co. Ltd., Montreal (Quebec).
For primary bibliographic entry see Field 2E.
W75-05999

NORMS AND CRITERIA FOR INITIATING SCIENTIFIC ASSESSMENT OF FLOOD DAMAGES IN NON-UNIFORM CONDITIONS IN MADHYA PRADESH STATE--INDIA,
Madhya Pradesh Government, Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 2E.
W75-06000

FLOOD DAMAGE IN NEW ZEALAND,
Ministry of Works, Wellington (New Zealand).
R. K. Howard.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 359-373. (1973) 1 fig, 2 ref.

Descriptors: *Flood damage, *Flood protection, *Costs, Flood plains, Watersheds(Basins), Flood control, Floods, River basin development, Overflow, Erosion.
Identifiers: *New Zealand.

New Zealand is a country of rugged topography and high rainfall. Early settlement was located near water transport and this fixed the present pattern of development with many urban communities situated in flood prone areas. Large-scale land development has significantly altered the natural hydrological characteristics and caused greater flood concentration, loss of fertile soil, lowering of water quality, and instability of many river channels. Flood damage costs were examined and measures adopted to control flooding and mitigate losses were stated. It was concluded that although the annual cost to New Zealand of flood damage is small in comparison to the gross national product (0.23%), it is still a substantial sum and represents a total loss to the nation. With increasing population and growing standards of living, this damage can be expected to rise unless flood-control measures are continued and especially if the associated measures described are not vigorously pursued. The river works will of course continue to suffer from flood damage but in time, as training works become more effective and more use is made of permanent materials, this damage should be held at a reasonable level. (See also W75-05973) (Humphreys-ISWS)
W75-06001

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06002

FLOOD ROUTING STUDIES OF GANDHISAGAR DAM,
Madhya Pradesh Irrigation Dept., Bhopal (India).
For primary bibliographic entry see Field 2E.
W75-06003

FLOOD WARNING THROUGH A HYDROLOGICAL-CUMsMATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
E. P. Kumaraswamy.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 397-407. (1973).

Descriptors: *Warning systems, *Flood forecasting, *Model studies, *Hydrologic aspects, River forecasting, Mathematical models, Hydraulic models, Networks, Remote sensing, Telemetry, River flow, Water levels, Surface waters, Rainfall, Simulated rainfall.
Identifiers: *India.

Described was a technique being developed at Poondi for forecasting floods and flows in the rivers of Tamilnadu, through the combined use of a mathematical model, a hydrological model, and VHF telemetry for each river basin. A hydrological model simulating the entire peninsular India between the latitudes 7 degrees N and 17 degrees N is under construction to a scale of 1/10,000. It is initially a rigid bed impermeable model. Rainfall will be simulated in intensity and distribution over space and time through shower nozzles. Surface run-off will be measured at river sections corresponding to their present gaging sites. Mathematical models are being postulated, and by a trial and error procedure, the parameters and constants for each mathematical model will be evolved through the operation of the hydrological model. Electronic radio sensors will be located strategically in the prototype for recording and transmitting rainfall, water levels, and other parameters. After the hydrological model is calibrated, the infiltration characteristics of the catchment area will be introduced with the objective of making the model more realistic. (See also W75-05973) (Humphreys-ISWS)
W75-06004

FLOOD PREDICTION METHOD OF RIVER WITH RESERVOIR AND CONFLUENCE OF TRIBUTARIES,
Kinki Univ., Osaka (Japan). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06005

FORECASTING FLOOD HYDROGRAPHS ON THE DANUBE USING THE PASSAGE THEORY,
Research Inst. for Water Resources Development, Budapest (Hungary).
J. Csoma, Z. Szigyarto, and T. Juracski.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 419-430. (1973) 1 fig, 2 tab, 9 ref.

Descriptors: *Flood forecasting, *Hydrograph analysis, *Flood waves, Discharge(Water), Rivers, Water levels, Hydrographs, Floods, Flood flow, Flood stages.
Identifiers: Hungary(Danube River), Passage theory, Hydrograph transformation.

The passage theory was applied to predict hydrographs of flood waves on the Danube remaining below overbank stages; the results obtained were used to evaluate the applicability of the method. A brief review was presented on the reliability of methods described in the literature, then, primary data related to the trial hydrograph forecasts were summarized. A discussion of the results was presented with the main conclusion that the reliability of the method is comparable to that of the principal methods described in the current literature. (See also W75-05973) (Humphreys-ISWS)
W75-06006

BASINWIDE FLOOD FORECASTING SYSTEM FOR THE LOWER MEKONG BASIN,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
S. Sangsnit.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 431-442. (1973) 3 fig, 3 tab, 6 ref.

Descriptors: *Flood forecasting, *Watersheds(Basins), *Streamflow forecasting, Hydrologic aspects, International waters, Water levels, Rivers, River forecasting, Programs, Forecasting, Computer models, River basins, Warning systems, Foreign countries.
Identifiers: *Lower Mekong Basin.

The flood forecasting system for the lower Mekong basin, started during the 1970 flood season on a trial basis and continued in 1971 and 1972, uses a modified Streamflow Synthesis and Reservoir Regulation (SSARR) computer model developed by the U.S. Corps of Engineers. Forecasts manually computed for stations in the delta, however, have been based on correlation of upstream hydrograph, local precipitation, and tidal cycle. Input data for the SSARR model are: all available precipitation and discharge data from reporting stations, computations of local inflows between mainstem gaging stations, and quantitative precipitation forecasts and outlooks for each of the eleven contributing sub-basins. Each forecast computation consists of a backup period of four prior days and a quantitative precipitation forecast for the next ten days beyond the current morning. Forecasts are manually adjusted to revise unreasonable and inconsistent estimates pinpointed by the SSARR program because computer reruns are not presently feasible. These adjustments consider the most likely error and probable effect on computed forecasts. All river stage forecasts, prepared for periods of one, two, three, four, and five days ahead for ten selected key stations are released to the appropriate government agencies of the four riparian countries on a regular basis, seven days a week, during the flood season. In the first two years, forecasts proved to be sufficiently reliable. (See also W75-05973) (Humphreys-ISWS)
W75-06007

FORECASTING OF FLOOD CHARACTERISTICS OF THE NILE,
Technical Univ. of Budapest (Hungary).
M. Szalay.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 443-454. (1973) 4 fig, 5 tab, 4 ref.

Descriptors: *Flood forecasting, *Hydrograph analysis, *Annual flood, Annual peak discharge, Floods, Water year, Runoff, Hydrographs, Estimating, Flood discharge, Peak discharge, River basins, River flow, Annual.
Identifiers: *Nile River.

The Nile and its tributaries have practically a single flood wave, lasting over the whole hydrological year. Regular features of the annual hydrographs, together with a similitude existing between these hydrographs enables the development of a particular method of predicting flood characteristics. With the knowledge of 2 months runoff volume at an upper gaging station of the Blue Nile, annual runoff volume of the Main Nile as well as its annual peak flood discharge can be forecast with a fair degree of accuracy. All previous attempts to make a forecast based on rainfall data have failed, owing mostly to the insufficient number of raingage stations in the river basin. (See also W75-05973) (Humphreys-ISWS)
W75-06008

EFFICIENT GATE OPERATION OF THE VAALDAM TO MINIMIZE DOWNSTREAM FLOOD DAMAGE,
Department of Water Affairs, Pretoria (South Africa).
S. M. Nicol.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 455-465. (1973) 3 fig, 4 ref.

Descriptors: *Flood forecasting, *Hydrographs, *Reservoir operation, Flood peak, Flood discharge, Floods, Reservoir releases, Discharge(Water), Operations, Flood control, Hydrology, Flow control.

Vaaldam is a water storage reservoir situated at the confluence of the Vaal and Wilge rivers in the Republic of South Africa. Nondimensional hydrographs were developed for Vaaldam and three upstream gaging stations. A method of predicting the flood volumes and peak inflow into the dam some days in advance was developed based on these hydrographs. A series of nomographs to determine the optimum dam discharge for a particular initial water level, peak inflow, and time before peak inflow were developed with the objective of optimizing the absorption factor of the dam for any large flood. With the aid of these nomographs, suitable dam discharge for gates is determined within established constraints for reservoir operation. The advantage of early flood peak prediction is that the level in the dam can be drawn down as far as required before the flood actually reaches the dam. Thus, the dam can be kept full at all times yet still retain a high flood absorption factor. (See also W75-05973) (Humphreys-ISWS)
W75-06009

MECHANISM OF BED LOAD TRANSPORT IN CHANNEL FLOWS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06010

APPLICATION OF STATISTICAL METHODS TO THE DISTRIBUTION OF FALL DIAMETER AND FLOW TURBIDITY,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06011

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06014

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6B.
W75-06018

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06045

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
For primary bibliographic entry see Field 8A.
W75-06047

FLOODWATER MANAGEMENT PLAN, NORTH BRANCH OF THE CHICAGO RIVER, LAKE AND COOK COUNTIES, ILLINOIS.
Chicago River Steering Committee, Chicago, Ill.
Metropolitan Sanitary District of Greater Chicago, October 1974. 108 p, 14 fig, 4 tab, 18 ref.

Descriptors: *Flood control, *Surface runoff, Flood stages, *River basin development, *Planning, Illinois, Streamflow forecasting, Hydrograph analysis, Urbanization, Detention reservoirs, Urban runoff, Non-structural alternatives.
Identifiers: *Chicago River, North Branch Chicago River.

A floodwater management plan was developed for the North Branch of the Chicago River watershed which covers 65,300 acres in Cook and Lake County, Illinois. The goals are to reduce flood damages, provide increased recreation and provide watershed protection and environmental enhancement. Planned structural measures consist of seven excavated floodwater retarding structures, modification of the Willow Road Dam to improve flood control and, contingent upon future need, a pumping plant and pipe line for the diversion of Lake Michigan water into the Skokie Lagoons and Skokie River. Estimated costs for these structural measures total $36,224,000. Planned non-structural measures consist of a flood plain management program to be accomplished by flood plain zoning regulations, a channel operation and maintenance program, a flood proofing program, and a land treatment program. These programs will be implemented prior to the installation of structural measures. The planned land treatment program is to be a continuous program throughout the life of the project. Average annual operation, maintenance, and replacement costs are estimated to be $71,850 for the planned structural measures. Total average annual benefits from the selected plan are estimated to be $3,758,000. Total average annual costs are estimated to be $2,657,450. (Poertner)
W75-06048

ANALYSIS OF THE EFFECTS OF STORAGE ON FLOOD MAGNITUDE AND STAGE IN THE NORTH BRANCH OF THE CHICAGO RIVER.
Hydrocomp, Inc., Palo Alto, Calif.
Northeastern Illinois Planning Commission, Chicago, August 1973. 71 p, 16 fig, 27 tab, 4 ref.

Descriptors: *Flood control, *Hydraulic similitude, *Storage, *Storm runoff, *Flood peak, *Computer models, Simulation analysis, Illinois, Urban runoff, Hydrology, River flow, River basins, Watersheds(Basins), Mathematical models, Streamflow, Stage-discharge relationships.
Identifiers: *Chicago River, North Branch of Chicago River.

The potential flood control benefits along the lower North Branch of the Chicago River in Cook County, Illinois were evaluated as a function of assumed reservoir location at ten different points in the watershed. Computer simulations were run previously to determine flow rates and river stages using runoff from the five largest rainstorms during the 46-year period 1925 to 1971. Runoff was adjusted to land use conditions anticipated in 1995. In the computer runs the benefits of each reservoir location were evaluated singly and in combination with others. Reservoirs located on the West Fork were shown to be much more effective in reducing flood peaks along the lower North Branch than for reservoirs on the Middle Fork or the Skokie River. The Willow Road site and the mile 24.5 site on the West Fork seemed potentially the most effective. A combination of two or more reservoirs on a tributory is not significantly more effective than the downstream reservoir alone. The effectiveness of reservoir storage in reducing downstream flood stage is directly related to the volume of natural flood plain storage in the watershed above the reservoir site. After the most cost-effective reservoir sites are identified, simulations should be run to determine the most effective operating procedures and final economic comparisons. (Poertner)
W75-06059

THE EFFECT ON PEAK FLOW FREQUENCY AT THE U.S.G.S. GAGE NO. 11-1627.2 ON COLMA CREEK FROM THE DEVELOPMENT OF 349 ACRES IN GUADALUPE CANYON.
Hydrocomp, Inc., Palo Alto, Calif.
Crocker Land Company, South San Francisco, California, April 1973. 45 p, 17 fig, 7 tab, 7 ref.

Descriptors: *Urban runoff, *Flood frequency, *Flood forecasting, *Computer models, *Peak discharge, California, Land development, Flood flow, Flood control, Flood profiles.
Identifiers: *South San Francisco(California), Colma Creek.

An assessment was made of the impact of the Visitacion Rancho Development proposed by the Crocker Land Company on the streamflow at the U.S.G.S. gage located on Colma Creek in South San Francisco. Increased urbanization over the last twenty years in the Colma Creek watershed in San Mateo County has increased the storm runoff and caused local flooding problems. The proposed development on the nothern edge of the watershed requires a quantitative estimate of the effect of development on storm-runoff magnitude and frequency to evaluate the impact upon the environment. The peak flow frequency relationship was established for Colma Creek under 1973 conditions based upon the environment. The peak flow frequency relationship was established for Colma Creek under 1973 conditions based upon continuous simulation of flow for the 1948-1973 historic period. The simulation was repeated assuming the proposed Crocker Land Development was completed and a second peak flow frequency relation obtained. The simulation of flows was performed with the Hydrocomp Simulation Program (HSP) which models the hydrologic process in detail. The HSP model was fitted to the Colma Creek data by calibration against the record of flow obtained by the U.S. Geological Survey for the period 1965-1972. The proposed 349 acre land development would increase peak discharges and flow volumes very slightly, in the range of 1 to 5 percent, at the U.S.G.S. gage on Colma Creek. Flood damages in past storms have occurred below the gage. The development would increase peak discharges and flow volumes by substantially larger amounts at points upstream in Colma Creek near the development site. These increases attenuate and become less significant as the flow moves downstream. (Poertner)
W75-06060

FLOOD PLAIN MANAGEMENT,
Army Engineer District, St. Paul, Minn.
R. E. Cox.
Paper presented at the 1972 American Public Works Association Public Works Congress and Equipment Show, Minneapolis, Minnesota, September 25, 1972. 7 p.

Descriptors: *Flood control, *Administration, *Flood plains, *Flood protection, *Federal government, Flood plain zoning, Flood plain insurance, Floodproofing, Governmental interrelations, Non-structural alternatives, Land use.
Identifiers: National Flood Insurance Program.

There are thousands of homes located in flood-prone areas which will experience or witness the terror, shock and frustration of flooding. The Corps of Engineers is gravely concerned with developments in flood plains, and since 1824 has been in the business of providing flood protection within the authorities and missions assigned by Congress. The Corps is supporting studies of the relationship between flood-proofing and building codes to fill a void in existing building codes and regulations. Flood proofing will allow essential uses of flood-prone areas without the disastrous results which have occurred recently. Flood control works, land use controls, and all relevant means and alternative approaches contributing to the appropriate use of flood plains must be considered and the best combination of all these means of reducing future disasters should be adopted. The Corps is working closely with the Department of Housing and Urban Development (HUD) in its planning and related implementation activities. HUD, through its Federal Insurance Administration, has called on the corps for a large share of the technical assistance in connection with the National Flood Insurance Program. A

community, in order to become eligible for flood insurance, must show evidence that they will adopt controls to prevent future unwise use of areas subject to floods. (Poertner)
W75-06063

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
For primary bibliographic entry see Field 3D.
W75-06071

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06076

SUDDEN MORTALITY OF A MASSIVE PHYTOPLANKTON BLOOM,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
For primary bibliographic entry see Field 5C.
W75-06091

THE COLORADO: A WEARY RIVER,
R. A. Grant, Jr.
Cry California, Vol 10, No 1, p 31-34, Winter 1974/75. 5 fig.

Descriptors: Surface water availability, *Water conservation, Management, *Water supply development, *Salinity, *Irrigation water, Energy, *California, *Colorado River Basin, Water shortage, Water resources, Water resources development, Colorado River Compact.
Identifiers: Southern California.

The Colorado River provides California with much of its water supply, as well as water to Wyoming, Colorado, Utah and New Mexico. Increasing demand for water results from an increase in energy development. Since the 1922 Colorado River Compact, the water resources have been intercepted for agricultural and urban uses which has led to an increase in salinity and pollution. California water agencies, responding to a reduced water supply and an increased demand, suggest that the river water should be used for energy development in its upper basin. This would not only provide more energy for Southern California but also decrease the effluent by returning purer, treated water to the river. Although this claim contradicts previous reports on the use of the Colorado River for energy, the state water agencies also argue that upper basin lands are not suited for agriculture, and therefore, irrigation, which increases salinity and pollution, is unnecessary. Underlying this report is the premise that Southern California is the Colorado River Basin's first priority. This concept has yet to be proven. (Salzman-North Carolina)
W75-06100

A MOSAIC PATTERN OF BALANCED LAND-WATER PLANNING FOR COTTAGE DEVELOPMENT AND LAKE PLANNING,
Toronto Univ. (Ontario).
For primary bibliographic entry see Field 6B.
W75-06101

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the County of St. Charles, Missouri, August, 1973, 33 p, 24 fig, 3 tab, 19 plates.

Descriptors: *Floods, *Flooding, *Flood protection, *Flood plains, *Flood profiles, Flood control, *Missouri.
Identifiers: *Femme Osage Creek(Mo.), St. Charles County(Mo.), Intermediate Regional Flood(IRF), Standard Project Flood(SPF).

The Femme Osage Creek, draining an area of 75 square miles, is lined with heavy timber on the fringe of an extremely wide and open farming valley. The channel slopes at 20 feet per mile and has an average width of 70 feet. The flood plain averages about 1000 feet in width and is free of encroachments except for a few roads and bridges. Four major tributaries increase the flood flow, St. Charles County has a comprehensive land use plan which calls for the flood plain to be used exclusively for agriculture, parks and open spaces. High intensity, short duration storms occurring mostly from April to September produce floods characterized by high peaks, high velocities, short duration and relatively small volumes of run-off. Back waters from the Missouri River induce flooding on the Creek's lower reaches. Light rains on frozen or saturated ground and warm rains on snow can also create floods. A channel change which relocated the extreme lower portion of the stream and accompanying levees provides some flood protection. Channel cleanouts and dikes are temporary measures. Past flood accounts are scarce although floods occur almost every year, often several times in one year. Most past floods have been relatively minor in magnitude, but the possibilities of an Intermediate Regional Flood and Standard Project Flood exist with estimated crests of 25.8 feet and 28.3 feet respectively above stream bed. Agricultural lands and residences would be flooded. Flood profiles detail water surface elevations and lateral extent of flooding that may be expected. (Salzman-North Carolina)
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Columbia, Missouri and the Missouri Water Resources Board, May, 1971. 31 p, 14 fig, 5 tab, 32 plates.

Descriptors: *Floods, Flooding, *Flood plains, *Flood protection, *Flood flow, *Flood profiles, Flood control, Flood discharge, *Missouri.
Identifiers: *Hinkson Creek(Mo.), Hominy Branch(Mo.), *Grindstone(Mo.), Columbia(Mo.), Intermediate Regional Flood, Standard Project Flood.

Hinkson Creek, flowing through Columbia, has a long narrow drainage area of 81 square miles. Its channel varies from 80 feet at the south end to 50 feet at the north with an average slope of 9 feet/mile. Flood plain width varies from 1500 feed to 1000 feet. Hominy Branch and Grindstone Creek, tributaries of Hinkson Creek with 6.7 square miles and 15.4 square miles of drainage area respectively, lie in the southeastern part of Hinkson Creek Basin. Bear Creek, northwest of Hinkson Creek, drains an area of 14.1 square miles and is approximately 7 miles long and 2 miles wide. Hinkson Creek flood plain development is sparse but is expected to expand rapidly. Several sewage treatment plants are in the area. Levees surrounding mobile and multifamily residential structures provide little protection. Floods are generally caused by short duration, high intensity thunderstorms, with flood flows having high peaks, high velocities, short duration and relatively small volumes of run-off. Flood damage prevention measures including levees, have been done by private interests. Manmade encroachments present the only obstruction to flood flows. A maximum flow was recorded on May 15, 1970, with a peak discharge of 9100 cubic feet per second (cfs) and cresting at 18.91 feet compared to a bankfull height of 15 feet. Past floods have been of minor magnitudes, but an Intermediate Regional Flood or a Standard Project Flood with a peak discharge of 35,000 cfs, would result in inundation of the flood plain. (Salzman-North Carolina)
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of Independence, Missouri, April, 1972. 28 p, 15 fig, 5 tab, 14 plates.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood profiles, Flood control, Flood protection, *Missouri.
Identifiers: *Rock Creek(Mo.), Independence(Mo.).

Rock Creek, with headwaters in southwest Independence, flows north into the Missouri River, draining an area of 9.2 square miles within the city limits. Average channel width is 30 feet with an average slope of 40 feet per mile. Flood plain has some residential development, a cemetery and two parks, and averages 400 feet wide. A stream gaging station established in 1967, newspaper files, historical documents and records provided information. Flood flows are usually caused by rapidly moving thunderstorms having high intensity rainfall and lasting from a few minutes to several hours. Flood flows, occuring during the months of March through October, have high peaks, high velocities, short duration and relatively small volumes of run-off. Bridges and culverts on the flood plain provide major obstructions to flood flow. A small channel improvement project will have little effect on a major flood. A maximum flow was recorded on June 26, 1969 cresting at 12.50 feet and having a peak discharge of 2100 cubic feet per second. The most recent flood occurred on September 22, 1970, cresting at 10.50 feet. Although past floods have been relatively minor in magnitude, the possibilities and characteristics of an Intermediate Regional Flood (IRF) or Standard Project Flood (SPF) are discussed. Flood profiles are detailed. Estimated peak discharges for an IRF and SPF are 7,000 cfs and 10,000 cfs respectively, based on records of nearby basins of similar characteristics. Over 150 buildings in the flood plain would be flooded and 11 bridges overtopped during an IRF with 100 additional bridges flooded during an SPF, with water above bankfull for about 7 hours. (Salzman-North Carolina)
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
Prepared for the City of St. Joseph, Missouri, June, 1973. 27 p, 17 fig, 2 tab, 19 plates.

Descriptors: *Floods, *Flooding, *Flood plains, *Flood protection, *Flood profiles, Flood control, Channel improvement, *Missouri.
Identifiers: *One Hundred and Two River (Mo.), *St. Joseph(Mo.).

One Hundred and Two River basin, 87 miles long and 21 miles wide, drains an area of 825 square mi. within Missouri and Iowa, where it originates. The River slopes at 4.7 ft./mi. along a very flat channel which becomes progressively steeper upstream. Because of the flatness of bottomlands the undeveloped agricultural flood plain is subject to widespread inundation. Most rainstorms move crosswise over the north-south flowing river. Between May and September violent rainstorms frequently cause multiple floods in a single year. Several miles of channel were straightened to reduce severity of flooding after the 1965 flood caused severe overbank flooding along roads and highways and total damage exceeding $702,000 was recorded. Because of expansion into the flood plain by St. Joseph, an important transportation center with food processing, meat packaging and other industries, population 72,691, five watershed projects are proposed for 45% of the drainage area. When completed these flood detention struc-

tures will provide protection only from minor floods in the upper basin with a negligible effect upon major flood flows in the study area. An Intermediate Regional Flood (IRF) could have deep water flowing at high velocity with a discharge of 37,000 cfs for the study area and possible flooding of the Faron Street Lagoon could result in pollution and create definite health hazards. In a Standard Project Flood extremely hazardous conditions would exist for about 108 hours with a discharge of 80,000 cfs throughout the study area. (Salzman-North Carolina)
W75-06110

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
J. S. Larson.
The Massachusetts Heritage, Vol 10, No 3, September 1973. 2 p, 3 ref.

Descriptors: *Massachusetts, *Wetlands, *Legislation, *Classification, *Adoption of practices, Administration, Bogs, Marshes, Freshwater marshes, Swamps, Aquatic environment, Freshwater, Wildlife conservation, Surface waters, Legal aspects, Water law, United States, Northeast U.S.

Massachusetts' failure to adopt statutory or regulatory definitions of a wetland has led to uncertainty among three hundred fifty-one local conservation commissions which administer the Wetlands Protective Act. The lack of a legal definition presents a serious hindrance to effective and reasonable administration of wetland legislation. Wetlands are areas of land where water is so abundant that it constitutes the major factor responsible for the nature of plant growth on the site. Relatively dry wetlands may have mature forests with ferns and springs on the forest floor. The most aquatic wetlands are the deep fresh marshes. One widely used system to classify and name wetlands is used by the United States Fish and Wildlife Service which recognizes twenty wetland classes. In the northeast, fresh meadows, shallow fresh marshes, deep fresh marshes, shrub swamps, wooded swamps, and bogs are the common freshwater classes. (Sperling-Florida)
W75-06161

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-WI-73-1295-F, $8.75 in paper copy, $2.25 in microfiche. August 3, 1973. 300 p, 8 fig, 18 tab.

Descriptors: *Environmental effects, *Reservoir operation, *Hydroelectric project licensing, *Federal government, *Wisconsin, Reservoirs, Administration, Governments, Water management(Applied), Water law, Administrative agencies, Permits, Electric power, Flood control, Hydroelectric power, Recreation, Low-flow augmentation, Federal Power Act, Multiple-purpose projects, Regulation, Legal aspects, Reservoir storage, Multiple-purpose reservoirs.
Identifiers: Environmental Impact Statements, Licenses, National Environmental Policy Act, Dam effects, *Chippewa Reservoir(Wis).

The Northern States Power Company, pursuant to the Federal Power Act, made application to the Commission for renewal of its license to operate the Chippewa Reservoir, Project No. 108, located on the Chippewa River in Wisconsin. Constructed in 1923, the project's primary purpose is to regulate streamflow for downstream hydroelectric power production, but it also provides flood control and recreational benefits, as well as low augmentation downstream. Continued operation of the project should not have any effect upon existing land and wildlife resources or water quality of the project. Dissolved oxygen depletions in isolated areas and the possibility of increased eutrophication due to further recreational development are recognized adverse effects of continued operation. Continuation of the present operation would maintain the productivity of project natural resources in their present state, which are consistent with existing land use patterns of the project. Alternatives considered include stabilization of the reservoir, modified stabilization, and federal takeover. None of the alternatives has any significant environmental benefits not present in the relicensing proposal. (Deckert-Florida)
W75-06167

DREDGING OF LEWIS AND CLARK CONNECTING CHANNEL, CLATSOP COUNTY, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Portland, Oreg.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OR-73-1422-F, $5.25 in paper copy, $2.25 in microfiche. August 29, 1973. 110 p, 8 fig, 2 tab.

Descriptors: *Oregon, *Environmental effects, *Channel improvement, *Dredging, *Transportation, Ports, Rivers and Harbors Act, Harbors, Excavation, Federal government, Siltation, Aquatic environment, Turbidity, Spoil banks, Navigation, Benthos, Bottom sediments, Rivers, Economic impact, Columbia River, Channel flow, Maintenance, Wildlife conservation, Animal populations, Saline water intrusion, Saline water, Rivers, Conservation, Saline water-freshwater interfaces, Administration.
Identifiers: *Environmental Impact Statements, *Astoria(Ore), *National Environmental Policy Act, *Navigation obstructions.

The proposed action authorized under the Rivers and Harbors Act of 1965 consists of dredging a navigational channel in the lower 4.5 miles of the Lewis and Clark River in Oregon to connect with an existing channel at the mouth of the Columbia River, dredged material to be placed on three diked areas beside the river. The channel is needed for access to the nearby port of Astoria and to the Crown Zellerbach Corporation log mill. Environmental impacts include improved navigation on the lower river, disturbance of fifty-seven subaqueous acreas, temporary turbidity, and deposition of dredged material raising ground level. Adverse effects include disturbance of aquatic and upland environment, changes in species distribution associated with upstream intrusion of salt water, and the effects of periodic maintenance. Alternatives besides no action consist of finding other modes of transportation and different locations for spoilage disposal. These were eliminated because of expense and adverse environmental effects. Permanent and perhaps undesirable changes in aquatic species are likely to result from this project. Comments were received from numerous federal, state and local agencies and citizen groups. (Dillingham-Florida)
W75-06169

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OK-73-1750-F, $4.75 in paper copy, $2.25 in microfiche. November 5, 1973. 82 p, 1 map.

Descriptors: *Environmental effects, *Oklahoma, *Federal government, *Reservoir operation, *Multiple-purpose reservoirs, Administrative agencies, Conservation, Multiple-purpose projects, Dams, Flood control, Flood protection, Impounded waters, Lakes, Recreation, Recreation facilities, Water resources development, Water management(Applied), Regulation, Reservoirs, Water control, Post-impoundment, Water policy, Land management, Water resources, Soil conservation.
Identifiers: *Environmental Impact Statements, Ouachita National Forest(Okla), Dam effects.

This project involves the continuous operation and maintenance activities at Wister Lake, a multiple-purpose reservoir facility located in the Ouachita National Forest in Oklahoma. These activities include flood control and reservoir regulation, maintenance of related structures and facilities, land resources management, and recreational management. The overall impact of this project is that of environmental improvement through the protection and management of available resources in the best interest of the human environment. Adverse effects include soil erosion and compaction due to heavy recreational use, damage to vegetation due to pool flutuation, and alterations of the natural environment through recreational development. Specific impacts and alternatives are dealt with in separate discussions concerning each activity. This project enhances the long-term utilization of the area as a water-oriented recreation area. The flood control operations preserve and stabilize the downstream environment, thereby enhancing development of the flood plain. (Deckert-Florida)
W75-06170

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-KY-73-1393-F, $3.75 in paper copy, $2.25 in microfiche. August 21, 1973. 45 p, 4 map.

Descriptors: *Environmental effects, *Kentucky, *Channeling, *Watershed management, *Governmental interrelations, Channels, Watersheds(Basins), Excess water(Soils), Water management(Applied), Drainage engineering, Drainage systems, Canal construction, Channel improvement, Canals, Ditches, Agricultural watersheds, Flood protection, Flood control, Erosion control, Runoff, Soil water, Federal government, Local governments, Administrative agencies, Multiple-purpose projects.
Identifiers: *Environmental Impact Statements, *Narge Creek(Ky).

This project proposes installation of 4.6 miles of multiple-purpose channel, for flood prevention and agricultural water management, and 1.6 miles of single purpose agricultural water management channel. The project will affect 4,205 acres of predominatly agricultural land located northeast of Madisonville, Kentucky. The area is presently subject to excessive flooding and wet soil conditions. The project is expected to reduce average floodwater damage by 66%, provide 100-year flood protection to 116 acres, and reduce the frequency of flooding and wetness to permit more intensive use of 1400 acres. The primary adverse effects of this project will be the preclusion of agricultural, forest, and terrestial wildlife use on 12 acres and the temporary interruption of such use on an additional 28 acres. Other alternatives considered were floodwater retarding structures, retarding structures in combination with channel modification, and no action. The proposed action was deemed to be most feasible in terms of costs and minimal adverse environmental effects. Thirty acres of woodland wildlife habitat will be lost due to changed land use brought about by the project. There is no significant opposition to this proposal. (Deckert-Florida)
W75-06171

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-OK-73-1557-F, $4.25 in paper copy, $2.25 in microfiche. September 28, 1973. 54 p, 1 map.

Descriptors: *Environmental effects, *Oklahoma, *Stream improvement, *Obstruction to flow, *Federal government, Floods, Flood control, Watershed management, Water management(Applied), Erosion control, Channel improvement, Administrative agencies, Flood protection, Bank stability, Channels, Streams, Rivers, Streamflow, Clogging, Bank stabilization, Water resources development, River flow.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Navigation obstructions.

This project consists of removing a logjam from the Deep Fork of the Canadian River three miles northeast of Okfuskee, Oklahoma. The logjam has been a problem in this area for over 15 years. Its condition is such that the slightest increase in streamflow causes the river to leave its banks resulting in erosion and frequent flooding in the area surrounding the logjam. The project will reestablish drainage of bottomlands used for agriculture, and will reduce flooding, bank caving, and erosion. Clearing and log disposal operations will affect natural vegetation over the six acre project area and will cause a temporary increase in turbidity during the removal period. Realignment of the channel was considered unacceptable as an alternative due to its considerably greater cost and adverse environmental effects. By reducing flooding, the project will enhance the long-term productivity of the adjacent lands. The proposed action will require the commitment of men and materials only, and faces no significant opposition. (Deckert-Florida)
W75-06172

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-VA-73-1861-F, $3.75 in paper copy, $2.25 in microfiche. November 28, 1973. 47 p, 4 map.

Descriptors: Environmental effects, *Chesapeake Bay, *Dredging, Federal government, *Channel improvement, *Virginia, Bays, Harbors, Rivers and Harbors Act, Estuaries, Sediment control, Shoals, Aquatic environment, Estuarine environment, Administrative agencies, Aquatic habitat, Aquatic life, Benthic flora, Benthic fauna.
Identifiers: *Environmental Impact Statements, Coastal waters, Spoil disposal, Coastal zone management, *Norfolk Harbor(Va).

Norfolk Harbor, Virginia, is part of the larger port of Hampton Roads Complex located at the southern end of Chesapeake Bay. This project involves the maintenance dredging of shoaled areas in three channels of Norfolk Harbor, requiring removal and disposal of 800,000 cubic yards of material. The dredging will restore the channels to authorized depths, and dredge spoil will be placed in the confined Craney Island Disposal Area. While maintaining the carrying capacity of the channel for navigation, this action will remove or disrupt some neritic and benthic organisms and will result in a temporary increase in turbidity near the dredge area. No dredging will take place during the spring and summer months, which are the spawning season for local fish. This will minimize the adverse effects on aquatic organisms. The alternative of no action was rejected due to its adverse effects upon national economic and defense interests. This project will not cause any change in either the short- or long-term productivity of the natural environment. There is no significant opposition to this action. (Deckert-Florida)
W75-06173

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

BUFFALO RIVER WATERSHED PROJECT, AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06175

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

MAJOR DRAINAGE PROJECT, RIVERVIEW, VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
Available from National Technical Information Service, Dept. of Commerce, Springfield, Virginia 22161, as EIS-WA-73-1921-F, $4.25 in paper copy, $2.25 in microfiche. December 12, 1973. 47 p, 8 fig.

Descriptors: Environmental effects, *Excess water(Soils), *Subsurface drainage, *Washington, Federal government, *Piping systems(Mechanical), Water management(Applied), Watersheds(Divides), Drainage systems, Administrative agencies, Urbanization, Subsurface waters, Groundwater, Groundwater movement, Subsurface runoff, Percolation, Suburban areas, Governmental interrelations, Adoption of practices.
Identifiers: *Environmental Impact Statements, *Pasco(Wash).

The proposed action will consist of installation of drainage facilities near the existing levee system adjacent to Lake Wallula. It will include a pumphouse, an underwater collector drain and discharge line, with provision for future lateral drains. It will provide control of rising groundwater to a 70-acre area of agricultural and residential land. The location is an expanding residential area for the City of Pasco, Washington. The system will empty through submerged outlets into Lake Wallula. The project will prevent water damage to structures already in the area and will permit continued suburban development. Manhole access openings, observation wells, and a pumphouse will be visible above ground. Major temporary disturbances will occur during construction. Nine cottonwood trees will be removed, and ponded areas used by waterfowl will be dried up. Major alternatives considered were: no action, adapt the area to public open space, and eliminate the irrigation system which is the source of increased groundwater. Although this project will commit the area to residential development, there is no significant opposition. (Deckert-Florida)
W75-06178

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-TN-73-0934-F, $4.75 in paper copy, $2.25 in microfiche. May 29, 1973. 98 p, 4 fig, 11 tab.

Descriptors: Environmental effects, *Stream improvement, *Tennessee Valley Authority, *Applachian Mountain Region, *Tennessee, Water management(Applied), Watersheds(Divides), Floods, Streams, Federal government, Flash floods, Channel improvement, Watershed management, Flood control, Turbidity, Flood protection, Stream erosion, Stream stabilization, Channeling, Stream flow, Wildlife management, Water resources development.
Identifiers: *Environmental Impact Statements, *Bricewell(Tenn), Lake City(Tenn).

The proposed project consists of 3.9 miles of stream improvement along Coal Creek to reduce the frequency and severity of flooding of developed areas between Bricewell and Lake City, Tennessee. The work primarily involves clearing, deepening, and widening various portions of the stream. The stream bottom and banks are presently littered with domestic rubbish and other manmade trash. Acid drainage from nearby coal mines has been a minor problem at times. Severe flash floods are often produced by summer storms. Adverse effects of the project include interference with aquatic life due to alteration of the habitat and a temporary increase in turbidity during construction. Clearing of trees and brush will result in alteration of 15 acres of low quality wildlife habitat. The following alternatives to the proposed action were considered: levees, dams and reservoirs, relocation of property, floodproofing, various channel improvement measures, and no action. Long-term productivity of the region will be enhanced. This project is supported by all interested groups. (Deckert-Florida)
W75-06180

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 7C.
W75-06186

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06196

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W75-06199

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

ANALYTICAL MODELLING OF SURFACE RUNOFF HYDROGRAPHS FOR MAJOR STREAMS IN NORTHEAST THAILAND,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2A.
W75-06269

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
J. R. Jovel.
Hydrological Sciences Bulletin, Vol 19, No 4, p 401-422, December 1974. 1 fig, 15 tab, 9 ref.

Descriptors: Water resources, *Water resources development, Potable water, Groundwater, Surface waters, Water utilization, Legal aspects, River basins, Water yield, River flow, Economics, Water policy, Atlantic Ocean, Pacific Ocean, Available water, Planning, Hydroelectric power, *Estimating.
Identifiers: *Central America.

The evaluation and development of water resources in Central America was described, including the estimation of surface and groundwater availability and the examination of the legal, institutional, and economic-financial aspects of sectorial water utilization. A description of the sectorial development programs for the period 1971-1980 was given together with the identification of the problems that prevent the optimum development of existing resources. The basic concepts for a policy of water resource development and conservation to be adopted were briefly outlined. River basins that deserved priority by the governments as well as specific studies that needed to be carried out were identified. (Roberts-ISWS)
W75-06270

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
B. D. Trafford.
Hydrological Sciences Bulletin, Vol 18, No 4, p 431-440, December 1973. 4 fig, 1 tab, 14 ref.

Descriptors: *Subsurface drains, *Tile drains, *Drainage engineering, *Pipe flow, *Drains, *Inflow, Equipment, Agriculture, Tile drainage, Tiles, Sinks, Europe, Groundwater movement, Seepage, Clay pipes, Drainage practices, Plastic pipes, Percolation, Drainage water, Subsurface drainage, Flow characteristics.
Identifiers: *Clayware drains, *Plastic drains.

Irrigation equipment was used to create strong flows in agricultural drains of clayware and plastic pipes, the latter in both smooth and corrugated conformations. The piezometric heads at 10 m intervals along the drains were analyzed to show that the inflow per unit length varied greatly. Both inflows and outflows were found; some drains had substantial inflows at the origin. For given conditions the flow rates were as much as 17% less than flow rates determined for similar conditions in the laboratory. (Sanderson-ISWS)
W75-06273

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 8B.
W75-06283

THE EFFECT OF THE DEPTH OF AN IMPERMEABLE BARRIER ON WATER-TABLE HEIGHTS IN DRAINDED HOMOGENEOUS SOILS,
Agricultural Research Council, Cambridge (England). Unit of Soil Physics.
For primary bibliographic entry see Field 2G.
W75-06294

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
For primary bibliographic entry see Field 6A.
W75-06328

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-06337

4B. Groundwater Management

IRRIGATION SYSTEM,
For primary bibliographic entry see Field 3F.
W75-05887

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
For primary bibliographic entry see Field 5B.
W75-06015

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
J. F. Riccio, J. D. Hardin, G. M. Lamb, L. Scarbrough, and K. P. Hanby.
Available for $2.00 from Geological Survey of Ala., P.O. Drawer O, University, AL. Also, available from the National Technical Information Service, Springfield, Va 22161 as PB-240 850, $7.25 in paper copy, $2.25 in microfiche. Alabama Geological Survey Bulletin 106, 1973. 181 p, 61 fig, 10 plates, 17 tab, 76 ref. OWRT B-038-ALA(2), B-032-ALA(2). 14-31-0001-3553.

Descriptors: Management, *Urban hydrology, Environment, *Water consumption, *Water supply, *Alabama, *Cities, Water quality, Flooding, Hydrologic aspects, *Groundwater, Surface water, Flood plains, Water management(Applied), Potable water.
Identifiers: Hurricane-tide floods, Flood plain management, *Mobile(Ala).

The hydrologic environment of Baldwin, Escambia, and Mobile Counties governs practically all the natural streamflow characteristics of those streams that originate within the area. The average annual precipitation for the area is 63.17 inches; average annual runoff is 18 to 28 inches; and average annual evapotranspiration about 60 percent of the average yearly rainfall. Hydrologic characteristics of the different watersheds are evaluated on the basis of flow-duration data. The expectancy of low flows for many of the area streams may be determined from frequency data based on streamflow records. Flood expectancy for most streams in the area may be estimated from frequency graphs based on streamflow records. Highest water levels in Mobile Bay are caused by tides associated with tropical hurricanes rather than by floods on the Mobile River. Large quantities of potable ground water are available from geologic units ranging in age from Eocene to Holocene that underlie the area-as much as 1 mgd in Mobile County, 0.5 to more than 1 mgd in Baldwin County, and similarly high yeilds over most of Escambia County. Small to large quantities of ground water are obtainable from sand and gravel units in Pleistocene terrace deposits and Holocene alluvium adjacent to major streams and their tributaries in all three counties. Estimates of future water needs of the city of Mobile indicate that the presently planned municipal water system will probably become incapable of supplying the city's residential water some time between 1986 and 1998. Salt-water encroachment is not a major problem in the area at present.
W75-06072

A SYSTEM FOR GEOLOGIC EVALUATION OF POLLUTION POTENTIAL AT MOUNTAIN DWELLING SITES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
For primary bibliographic entry see Field 5B.
W75-06075

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-06083

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
April, 1974, 60 p. 11 fig, 2 tab.

Descriptors: *Regional development, *Water resources development, *Surface-groundwater relationships, *Environmental effects, *Geologic investigations, *Planning, Long-term planning, Groundwater resources, Aquifers, Soil, Physical properties, Soil investigations, Land use, Urbanization, Karst, Karst hydrology, *Florida.
Identifiers: *Tampa(Fla.), Hillsborough County(Fla.).

A geologic, hydrologic, and soil study of Hillsborough County, Florida, establishes guidelines for development based on natural carrying capacities. Since 1950 Hillsborough County, which includes metropolitan Tampa, has more than doubled in population to exceed half a million. Environmentally sensitive areas to be protected from urbanization include the interrelated wetlands: inland swamps, riverine systems, and the estuarine environment. Annual rainfall on this low flat area averages 51 inches, with 60% coming between June and September, causing periodic flooding of three major and many minor rivers. Pressure to develop a flood plains should be resisted to avoid flood damage. The underlying limestone aquifer strata have developed a Karst topography with many sinkholes, caves, and surface springs above dissolved cavities. Ample groundwater supplies are being depleted and are in danger of contamination from septic tank and other contaminants which flow down to the underlying aquifer. Natural recharge of the aquifer is aided substantially by the cypress sloughs which hold flood water and are connected in a slow drainage pattern. These should be retained, as well as the coastal salt marshes and mangrove stands which help protect the coast from tidal flooding. Maps show areas suitable for development and areas which should be maintained as greenbelt. (Herr-North Carolina)
W75-06105

STOCHASTIC ANALYSIS OF PHREATIC AQUIFERS,
Massachusetts Inst. of Tech., Cambridge. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06138

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06140

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia, 22161, as EIS-CA-73-1681-F-1, $13.60 in paper copy, $2.25 in microfiche. October 24, 1973. 519 p, 105 fig, 52 tab.

Descriptors: *Geothermal studies, *Wells, *Electric power, Drilling, Steam, Electric power demand, Watershed management, Byproducts, *California, Recreation, Terrain analysis, Grazing, Forestry, Waste water disposal, Fish, Wildlife, Wastes, Subsidence, Access routes, Waste disposal.
Identifiers: *Environmental Impact Statements, *Clear Lake-Geysers, Mono Lake-Long Valley and Imperial Valley(Cal), Environmental Protection Agency.

The project involves implementation of the Geothermal Steam Act of 1970, which privides for development of federally owned geothermal resources. Included in the proposed action are promulgation of leasing and operating regulations pursuant to which the program is to be administered and the leasing of federally-owned geothermal resources for development at Clear Lake-Geysers, Mono Lake-Long Valley, and Imperial Valley in California. The lands under consideration for geothermal leasing are presently subject to use for grazing, forestry, mining, fish and wildlife habitat, recreation and watersheds. The development of geothermal resources entails construction of access roads and well sites, drilling and testing of wells, conveyance of steam over short distances to electric power plants and by-product processing plants, construction and operation of electric power plants, by-product facilities, electrical transmission lines, and facilities for disposing of waste liquids. The project would result in the preemption or restriction of the present uses of the land and modification of the terrain. Additionally, noise and noxious gas emissions may pose problems during testing and production. Other possible adverse effects include land subsidence due to production of fluids and increased seismicity due to production and reinjection of fluid wastes into producing zones. Alternatives considered include utilization of other sources for electrical energy and alternative exploration and leasing programs. (Gagliardi-Florida)
W75-06166

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-780 261, $5.75 in paper copy, $2.25 in microfiche. February 1974. 129 p, 2 tab, 11 ref, 3 append.

Descriptors: *Groundwater, *Groundwater availability, *Groundwater resources, *Subsurface waters, Aquifers, Aquifer characteristics, Glacial aquifers, Water table, Specific capacity, Wells, Chemical analysis, Michigan, Water quality, Basic data collections, Well data.

Subsurface water data for the Upper Michigan Region were compiled and synthesized into drawings, tables, and text dealing with the subsurface water hydrology of the study area. Tabulations of selected well records, well yield data, and water quality data were presented. The amount of water that can be extracted by wells within the study area varies greatly. Moderate yields (a few tens of gallons per minute) are generally available from wells penetrating the Paleozoic sandstones and limestones at the southeast and northwest margins of the study area. Older Precambrian rocks underlying the central portion of the area yield very small amounts of water to wells. Glacial outwash sands and gravels along the major streams may yield several hundred gallons per minute. In contrast, a few gallons per minute for domestic supply is difficult to obtain where the glacial materials are thin and/or clayey. The quality of the groundwater throughout the area is generally good. The only minor problems frequently encountered are hardness and excessive iron concentrations, both of which can usually be alleviated by standard water treatment methods. (Gibb-ISWS)
W75-06236

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-06251

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
B. M. Wilmoth.
Ground Water, Vol 13, No 1, p 25-32, January-February 1975. 2 fig, 1 tab, 7 ref.

Descriptors: *Water supply, *Groundwater resources, *Aquifers, *Chlorides, *Encroachment, Fractures(Geologic), Permeability, Bedrock, Sandstones, Carbonate rocks, Alluvium, Connate water, Dissolved solids, Pollutants, Water wells, Waste disposal wells, *West Virginia.
Identifiers: Well yields, Waste brine injection, Connate brines, Pennsylvanian aquifers.

Salt-water migration into relatively shallow rocks in the western half of West Virginia is already rather far advanced. Because of the wide distribution of salty groundwater and connate brine at various depths, it is difficult to determine how much of the contamination is natural and how much is the result of subsurface industrial activities. Although some local salt-water problems are the result of oil and gas operations, much of the regional near-surface salt water is a natural condition unrelated to deep drilling or other industrial activities. Groundwater is usually more abundant from consolidated aquifers beneath the valleys than from beneath the ridges. However, the presence of shallow salt water beneath the valleys imposes limitations on the availability of fresh water from a single well. Because most well fields must be located along the populated valleys, the problem of interception of salt water is the most important factor limiting development of consolidated bedrock aquifers. By utilizing the history of development and operation of well fields, an estimate of the availability of fresh water can be made, and test drilling and new well field construction guided accordingly. (Schicht-ISWS)
W75-06258

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06259

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
For primary bibliographic entry see Field 4A.
W75-06270

THE PERMEABILITY AND STORAGE OF AN UNCONFINED CHALK AQUIFER,
Institute of Geological Sciences, London (England). Dept. of Hydrogeology.
For primary bibliographic entry see Field 2F.
W75-06274

VERTICAL PERMEABILITY FROM LIMITED ENTRY FLOW TESTS IN THICK FORMATIONS,
Amoco Production Co., Tulsa, Okla.
R. Raghavan, and K. K. Clark.
Society of Petroleum Engineers Journal, Vol 15, No 1, p 65-73, February 1975. 7 fig, 2 tab, 23 ref.

Descriptors: *Permeability, *Penetration, *Aquifer testing, *Graphical analysis, *Anisotropy, Equations, Aquifers, Drawdown, Oil reservoirs, Pressure, Artesian aquifers, Flow, Transition flow, Porous media, Mathematical models.
Identifiers: *Vertical permeability, Spherical source, Dimensionless variables, Skin effect, Radial flow, Wellbore radius.

The applicability of spherical flow equations to a well open to a limited section of a thick anisotropic formation was examined. An examination of the dimensionless pressure-dimensionless time graph can provide useful information regarding the effect of the producing time and shut-in times required to apply the spherical flow equations. Once the proper straight line has been identified and permeability values calculated, time checks should verify the results. For a given location and size opening, the validity of spherical flow assumptions is a function of the anisotropy and flowing (or shut-in) time. Vertical permeability may be obtained from the slope of the pressure drawdown and/or buildup graphs if the horizontal permeability is known. This calculation is unaffected by the magnitude of the van Everdingen and Hurst skin effect. Horizontal permeability may be obtained if the skin effect is negligible or can be independently determined. The spherical wellbore radius approximation suggested by Rodriguez-Nieto and Carter is superior to that suggested by Culham. (Visocky-ISWS)
W75-06282

ON THE HYDROLOGY OF THE EDWARDS LIMESTONE, SOUTH CENTRAL TEXAS,
California State Univ., San Diego. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2F.
W75-06287

SIMULTANEOUS PUMPING OF FRESH AND SALT WATER FROM A COASTAL AQUIFER,
Department of the Environment, Ottawa (Ontario). Inland Waters Directorate.
A. Vandenberg.
Journal of Hydrology, Vol 24, No 1/2, p 37-43, January 1975. 4 fig, 1 tab, 2 ref.

Descriptors: *Saline water intrusion, *Mathematical models, *Water wells, Potentiometric level, Aquifers, Transmissivity, Pumping, Drawdown.
Identifiers: *Salt-water wells.

When fresh water is pumped from an aquifer which is open to a recharging salt-water body, care must be taken to avoid the encroachment of salt water into the well. A measure which sometimes may be taken when there is also a demand for filtered salt water is to supplement the fresh-water well by a salt-water well, located between the freshwater well and the coast, and to pump both wells at comparable rates. The idealized case was analyzed where the aquifer is confined, thin, homogeneous and isotropic, semi-infinite in areal extent, and bounded on one side by a straight recharge boundary; it was furthermore assumed that the nonpumping piezometric surface of the aquifer has a steady, uniform slope towards the boundary. As a result of the analysis, a relation was established between the distances from each of the wells to the boundary, the ratio between the pumping rates of the two wells, and the maximum pumping rate at which no salt water is induced into the fresh-water well; this relation can be used in the selection of the optimum location of the pair of wells. (Schicht-ISWS)
W75-06296

4C. Effects On Water Of Man's Non-Water Activities

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
For primary bibliographic entry see Field 4D.
W75-05912

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05913

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05914

FOREST DRAINAGE IN NORTH CENTRAL UNITED STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
For primary bibliographic entry see Field 4D.
W75-05918

REGIMES OF STREAMFLOW AND THEIR MODIFICATION BY LOGGING,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
J. Rothacher.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970, Oregon State University, Corvallis, p 40-54, August 1971. 9 fig, 14 ref. PNW-1602.

Descriptors: *Streamflow, *Evapotranspiration, *Precipitation(Atmospheric), *Lumbering, Burning, Demonstration watersheds, High flow, Peak discharge, Low flows.

Streamflow in the Pacific Northwest is most strongly influenced by the precipitation pattern, somewhat less by evapotranspiration losses. Evaporation and transpiration are strongly influenced by logging. Logging and burning old-growth Douglas-fir forests on an experimental watershed increased annual yields of streamwater by 18 inches or more. Most of the increase occurred in fall and winter months. Logging which removed transpiring vegetation increases lowest summer streamflow. Such increases may be short lived as vegetation rapidly invades the cutover areas. (Forest Service)
W75-05925

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05927

THE FUTURE ROLE OF CHEMICALS IN FORESTRY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant, H. J. Gratkowski, and W. E. Waters.
General Technical Report PNW-6, May 1973. 10 p, 19 ref. Paper presented before Comm. I, 'The Silviculturists,' at the Seventh World Forestry Congress, Buenos Aires, Argentina, October 4-18, 1972. PNW-1602.

Descriptors: *Forest management, *Pesticides, *Agricultural chemicals, Pesticide residues, Ecology.

The more selective, less persistent chemicals will continue to play an important role in forest resource management, probably for several decades, while man readjusts his numbers and modes of life to the rapidly dwindling resources of the earth. However, chemical use must eventually be minimized, for it is simply a system of treating symptoms of unhealthy ecological conditions created by nature or man in the past. (Forest Service)
W75-05935

PIPELINES IN FORESTED WETLANDS: CROSS DRAINAGE NEEDED TO PREVENT TIMBER DAMAGE,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter, and G. E. Close.
Journal of Forestry, Vol 72, No 9, p 561-563, September 1974. 8 fig, 10 ref.

Descriptors: *Pipelines, *Wetlands, *Organic soils, *Water levels, *Ditches, Excess water, Flooding, Flood damage, Great Lakes Region, *Minnesota, Forests, *Drainage.
Identifiers: Wetland forests, Peatland, Timber damage, Wetland hydrology, Cross drainage, Chippewa National Forest(Minn).

Large natural gas and petroleum pipelines that cross forested wetlands block normal water flow, raising the water table on the upslope side, which significantly reduces growth or even kills the trees. Such damage has been prevented on the Chippewa National Forest in north-central Minnesota by excavating ditches during construction to provide the necessary cross drainage. (Forest Service)
W75-05939

HISTORY OF WATER SUPPLY OF THE MOBILE AREA, ALABAMA,
Geological Survey, University, Ala. Water Resources Div.
For primary bibliographic entry see Field 3D.
W75-06071

DEVELOPMENT OF A HYDROLOGIC CONCEPT FOR THE GREATER MOBILE METROPOLITAN-URBAN ENVIRONMENT,
Geological Survey, Univeristy, Ala. Water Resources Div.
For primary bibliographic entry see Field 4B.
W75-06072

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
For primary bibliographic entry see Field 6E.
W75-06150

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06172

HERBICIDES AND WATER QUALITY IN AMERICAN FORESTRY,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5B.
W75-06333

CHEMICAL CHANGES IN STREAMFLOW FOLLOWING SURFACE MINING IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5B.
W75-06334

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-06338

4D. Watershed Protection

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8B.
W75-05851

PROCEEDINGS OF THE JOINT FAO/U.S.S.R. INTERNATIONAL SYMPOSIUM IN FOREST INFLUENCES AND WATERSHED MANAGEMENT, MOSCOW, U.S.S.R. 17 AUGUST-6 SEPTEMBER 1970.
Food and Agricultural Organization, United Nations (Rome), 1972. 452 p.

Descriptors: *Watershed management, *Precipitation(Atmospheric), *Streamflow,

*Research facilities, *Evapotranspiration, *Water budget, *Soil water, *Hydrologic cycle, *Forests, Water quality, Wetlands, Erosion control, Flood control, Snow management, Forest management, Planning, Energy budget, Micrometeorology, Mesoclimate, Education.
Identifiers: *Forest influences, *Forest microclimate.

Objectives of the Symposium were to provide the opportunity for scientists of USSR, representative scientists of western nations, and fellows from developing nations engaged in forest hydrology research to meet, determine the state of knowledge, and to set the stage for future research. Two primary aims were to provide developing countries with current information on forest influences and methods of watershed management and to provide a forum for exchange of information among scientists engaged in forest hydrology research. Twenty-one fellows representing 16 developing countries attended the meeting and participated in the discussions. Scientific papers were presented by 28 scientists from USSR, United States, United Kingdom, the Federal Republic of Germany, Switzerland, and Japan. Papers and discussions are included in the proceedings. Forest resource and watershed management problems of the developing countries are described. The technical papers were organized under 11 major subjects--precipitation, vaporization, soil water, hydrologic processes, practical management implications, water and air quality, wet land management, erosion and flood control, multiple-use management, management planning, and organization of education and research. Research and research facilities underway at 8 western USSR laboratories are described, including the principal hydrologic laboratory at Valdai. An appendix includes a discussion of the organization of forest management and utilization of forest effects on environment in the USSR. (See W75-05913 thru W75-05915) (Anderson-Forest Service)
W75-05912

FOREST AND METEOROLOGICAL INFLUENCES ON SNOW AND SNOWMELT WATER AND THEIR MANAGEMENT,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
H. W. Anderson.
In: Proceedings of the Joint FAO/USSR International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August-6 September 1970, Food and Agricultural Organization, United Nations, (Rome). p 41-54, 1972. 2 fig, 113 ref.

Descriptors: *Snow cover, *Snowmelt, *Snow management, *Evapotranspiration, *Mountain forests, Brush, Floods, *Lumbering, *Watershed management, Winds, Windbreaks, Regression.
Identifiers: Forest patterns, Forest canopy.

In many forest and mountain zones, snowmelt is an important source of water supply, of damaging flood water, or both. Hence, forest management may need to be guided by knowledge of the hydrologic processes of snow accumulation, snowmelt, and retention and delivery of snowmelt water. Research has shown that the harvest of forests in snow zones can influence the amount and timing of water yield, flood frequencies, and sedimentation. Similarly, the conversion of shrub-dominated land to forest can increase water yield while the conversion takes place, and eventually permanently affect snowmelt rates. Control of snow in mountain areas by mechanical fences or by planting of tree screens can benefit snow accumulation and result in prolonged water yield. Quantitative effects are reported for a few specific techniques in specific areas, concentrating on forest and meteorological aspects of snow. Additional references mostly U.S. papers, are given including summary reports, and specific references to studies of snow accumulation and melt, snowpack characteristics, snow evaporation, snow melt-water delivery and prediction, snow damages, and snow surveying, sampling and measurement. Some topics not summarized in any detail were--snow sampling and measurement, snow avalanche control, mechanical control of snowmelting, permanent snow fields, and glaciers, but some references to these topics have been included. (See also W75-05912) (Forest Service)
W75-05913

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W75-05915

SEDIMENT DEPOSITION IN RESERVOIRS ASSOCIATED WITH RURAL ROADS, FOREST FIRES, AND CATCHMENT ATTRIBUTES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05916

PLANTING GRASS AND PINE FOR EROSION CONTROL,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
P. D. Duffy.
Tree Planters' Notes, Vol 25, No 1, p 10-13, February 1974. 2 fig, 2 tab, 3 ref.

Descriptors: *Erosion control, *Vegetation establishment, *Fertilization, Slope stabilization, *Loblolly pine trees, Control, Reforestation, Coastal Plain, *Mississippi, Competition.
Identifiers: *Lovegrass, *Fingergrass.

Establishing a closed pine stand is one of the surest ways to reduce erosion from bare, forestland sites, but since pines may require up to 10 years to produce sufficient litter to fully protect a site, interim protection is often desirable. Planting a fast growing grass with pine is one practical method if the two can be made compatible. On sandy soils in northern Mississippi, fast growing weeping lovegrass (Eragrostis curvula), fully fertilized shortly after planting, overwhelmed loblolly pine (Pinus taeda L.) and reduced first-year survival to 33 percent. Applying two-thirds of the fertilization in late July slowed grass growth and allowed adequate pine survival (73%) to eventually control erosion. Area covered by grass at the end of the first growing season was not significantly reduced by the delayed application. On loam soil, lovegrass reduced pine survival to 58 percent when fully fertilized at planting, but delayed fertilization still improved survival. Slower growing fingergrass (Digitaria eriantha) also allowed adequate survival, but provided less protection than lovegrass. Results demonstrate combined plantings are feasible for rapid and long-term site protection if competition between species is controlled. (Forest Service)
W75-05917

FOREST DRAINAGE IN NORTH CENTRAL UNITED STATES,
Forest Service (USDA), Grand Rapids, Minn. North Central Forest Experiment Station.
D. H. Boelter.
In: Proceedings of the International Symposium on Forest Drainage, September 2-6, 1974; Jyvaskyla and Oulu, Finland; p 201-206, (1974). 13 ref.

Descriptors: *Central US, *Wetlands, *Drainage, *Forest management, *Organic soils, *Excess water(Soils), Soil water, Reforestation, Silviculture, Watershed management, Saturated soils, Water table, Great Lakes Region, Physical properties, Minnesota, Wisconsin, Michigan.
Identifiers: Wetland forests, Peatlands, Forest drainage, Water level control.

Forest improvement on peatland forests in the north central United States is largely limited to regeneration of forests following the harvesting of mature stands. Drainage and fertilization, practices common in northern Europe, have not been used extensively because the available upland timber sites have provided ample timber so far. However, as demand for wood products and the use of more upland areas for wilderness and recreation increase, more intensive management will likely be considered for peatland areas. (Forest Service)
W75-05918

TRANSITION IN RESEARCH ON SMALL FORESTED WATERSHEDS IN WEST VIRGINIA,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 2A.
W75-05919

THE EFFECT OF HERBACEOUS VEGETATION ON SURVIVAL AND GROWTH OF TREES PLANTED ON COAL-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. G. Vogel.
In: Research and Applied Technology Symposium on Mined-Land Reclamation. March 7-8, 1973, Bituminous Coal Research, Inc., Monroeville, Pennsylvania, p 197-207, (1973). 5 tab, 8 ref.

Descriptors: *Soil stability, *Strip mines, *Appalachian Mountain region, Trees, Plant growth, *Erosion control.

To obtain quick cover and strip-mine spoil stabilization, it is desirable to establish herbaceous and woody species in combination. However, herbaceous vegetation competes with tree species for light, moisture and nutrients. After three growing seasons, the herbaceous vegetation did not significantly affect the survival of trees but greatly suppressed their growth. By the fifth growing season, tree growth was suppressed by grass alone and was greatest in plots dominated by legumes. It appears competition from herbaceous vegetation can be lessened by encouraging legumes and avoiding strongly competitive grasses. (Forest Service)
W75-05920

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5G.
W75-05921

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05926

ROLE OF BEDROCK IN WATERSHED MANAGEMENT,
Forest Service (USDA), Boise, Idaho. Intermountain Forest and Range Experiment Station.
W. F. Megahan.
In: Proceedings of the Irrigation and Drainage Division Specialty Conference, Fort Collins, Colorado, April 22-24, 1973, American Society of Civil Engineers, New York, p 449-470, (1973). 1 fig, 2 tab, 38 ref.

Descriptors: Bedrock, *Watershed management, Hydrology, *Hydraulic conductivity, *Porosity,

*Storage, Geology, Water yield, Flow hydrographs, Erosion, Landslides, Subsurface flow, Water quality, Base flow, Streamflow.
Identifiers: *Bedrock weathering, *Bedrock fracturing.

In recent years, watershed managers have begun to include depth to bedrock as an additional watershed parameter to be considered when evaluating effects of watershed management practices. However, the properties of the bedrock itself have been neglected for the most part. Evidence is presented to illustrate that basic bedrock properties including bedding, fracturing, weathering, and chemical composition are important characteristics that help regulate hydrologic performance. Thus bedrock may govern the kind and degree of watershed responses to land management practices. Effects of management practices on streamflow and erosion are considered at two levels--at the broad planning level and on specific project areas. (Forest Service)
W75-05932

IN-CHANNEL SEDIMENTATION BASINS--A POSSIBLE TOOL FOR TROUT HABITAT MANAGEMENT,
Forest Service (USDA), St. Paul, Minn., North Central Forest Experiment Station.
For primary bibliographic entry see Field 8I.
W75-05937

DIFFICULT ERODED PLANTING SITES IN NORTH MISSISSIPPI EVALUATED BY DISCRIMINANT ANALYSIS,
Forest Service (USDA), Oxford, Miss. Southern Forest Experiment Station.
P. D. Duffy, and D. C. McClurkin.
Soil Science Society of America Proceedings, Vol 38, No 4, p 676-678. July-August 1974. 1 fig, 2 tab, 11 ref.

Descriptors: *Vegetation establishment, *Soil density, *Soil physical properties, *Statistical methods, Erosion control, Loblolly pine, Soil chemical properties, Slope protection, Road banks, Reforestation, *Mississippi, Gulf coastal plain, *Bulk density.

A discriminant analysis of physical and chemical characteristics of the upper 23 cm of the soil was computed for 24 sites where bar-planted loblolly pines (Pinus taeda L.) had failed and at 15 successful plantations near the fail sites. Screening of 17 soil properties indicated that bulk density is the best predictive variable. A function based only on bulk density correctly classified 74% of the sites as fail or success, regardless of microrelief. On sites where bulk density equaled or exceeded 1.45 g/cu cm, plantings were predicted to fail. Information on a site's proximity to the rim or bottom of a deep gully improved accuracy of classification. Since other soil properties differed relatively little between success and fail sites, results suggest that high bulk density substantially contributed to pine mortality, either through physical impedance of root growth or poor aeration or by interference with proper planting. Bulk density measurements can determine the need for site preparation or alternate planting methods to help ensure success. Discriminant analysis appears to be a useful means for separating areas into two or more groups to aid land use or treatment decisions. (Forest Service)
W75-05938

RECENT RESEARCH IN RUNOFF ESTIMATES FROM SAMLL RURAL WATERSHEDS,
Federal Highway Administration, Washington, D.C.
For primary bibliographic entry see Field 2A.
W75-05980

FLOOD CONTROL IN THE PLAIN RIVERS,
Universidad Nacional Autonoma de Mexico, Mexico City. Dept. of Civil Engineering.
J. A. Maza Alvarez, and M. A. F. Lira.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 303-314. (1973) 2 fig.

Descriptors: *Flood control, *Dredging, *Flood protection, *Mexico, Desilting, Channel improvement, Cutoffs, Diversion, Levees, Dikes, Sediment control.
Identifiers: Schoonmaker dredge, Panuco River, Tampaon River.

One of the procedures proposed to protect some river side zones of the Panuco and Tampaon Rivers was described. This method consists of augmenting the hydraulic capacity of the main river channel by cutting through meanders and by installing dredging stations immediately on the downstream side of each cut meander to impede the transport of a greater quantity of the solid material to the lower river sections where it would be deposited. The control of silting can be done by conventional methods if the river is navigable. However, if the river is not navigable, the solid material can be withdrawn from the bottom with a stationary dredge of the Schoonmaker type. Its employment was recommended only for river beds with sandy bottoms. The performance of the Schoonmaker dredge, which is economically operated and self sand cleansing, was described. (See also W75-05973) (Humphreys-ISWS)
W75-05996

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
D. R. Sikka.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 329-339. (1973) 2 fig.

Descriptors: *Flood protection, *Bank stabilization, *Hydraulic structures, Bank protection, Aprons, Boulders, Erosion control, River training, Riprap, Rivers, Slope protection.
Identifiers: India(Narmada River), Ghats.

The channel control and stabilization method adopted for the left bank of the Narmada River (India) for protection of Hoshangabad Town was described. A flexible boulder apron was provided along the river bank slope, the toe of slopes, and the river bed. This flood protection scheme also included heavy stone stepped ghats at the top of the river bank. This type of protection works was economical and readily adaptable to construction techniques based on manual and semimechanical operations. Construction was completed in 1961 and was subjected to maximum flooding. The protection works stood well without any displacement or damage. (See also W75-05973) (Humphreys-ISWS)
W75-05998

SEDIMENT DISCHARGE CONTROL BY MEANS OF SETTLING BASINS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
Y. A. Ibad-Zade, and C. G. Nuriev.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 491-498. (1973). 3 fig, 2 ref.

Descriptors: *Sediment control, *Settling basins, *Sediment discharge, Desilting, Rivers, Design, Settling velocity, Suspended load, Turbidity, Sedimentation rates, Deposition(Sediments), Irrigation canals.
Identifiers: *USSR.

The Caucasian and Central Asiatic Rivers carry large sediment loads which must be controlled to reduce deposition in irrigation canals. Horizontal-type sedimentation basins are widely used to reduce the amount of sediments entering the canals. Over a number of years, theoretical and experimental studies were performed for estimation of regularities of sediment load transport and sedimentation in basins in order to develop effective measures of their removal. The results of research allowed some regularities of sedimentation in basin length to be obtained, its dimensions to be estimated, and a calculation method for sediment removal to be recommended. The regularities obtained were confirmed by field data on prototype sedimentation basins. (See also W75-05973) (Humphreys-ISWS)
W75-06012

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
J. A. Ibad-Zade.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 499-510, (1973). 3 fig, 1 tab, 4 ref.

Descriptors: *Flood control, *Sediment control, *Alluvial channels, Channel improvement, Running waters, Scour, Stream erosion, Levees, Flood protection, River regulation, Regime, Equations, Design, Cutoffs, Rivers.
Identifiers: *River mechanics.

Flood control measures discussed for increasing the capacity of existing channels were streamflow regulation, levees, river training, river bottom deepening, and bank protection. Theoretical and experimental results were presented which related water discharge and soil conditions for dynamically stable channels, designing bottom deepening cuts to prevent silt deposition, designing levees, and designing cutoffs for river training. (See also W75-05973) (Humphreys-ISWS)
W75-06013

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
W. D. Seitz, G. F. Spitze, and M. B. Sands.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 830, $5.25 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 99, February 1975. 111 p, 28 tab, 10 fig, 57 ref. OWRT A-061-ILL(1). 14-31-0001-4013.

Descriptors: *Alternative costs, *Alternative water use, *Water policy, *Soil conservation, *Linear programming, Watersheds(Basins), *Cultivation, *Rotations, Erosion control, *Sediment control.
Identifiers: *Agricultural policy, Conservation tillage.

Alternative policies for reducing the level of erosion and sedimentation are evaluated with a linear programming analysis of farms in a selected watershed. Three conservation practices and three tillage practices are considered in combination with six crop rotations on approximations of nine

actual farms located in representative sections of the watershed. The impact of these practices on crop production costs and yields is considered, as is the impact on the off-site damages to the drainage system and the reservoir. Policies considered included subsidization of the cost of adopting conservation practices and subsidies to induce removing land from production, several forms of regulations and an effluent tax. Where appropriate the policies were analyzed assuming implementation at both the watershed and the farm level. This analysis indicates that soil conservation practices should be increased substantially in order to reduce the gross soil loss in the watershed from over 20 to approximately 6 tons per acre per year. This reduction is most effeciently accomplished by modifying conservation practices, tillage practices, and crop rotations. An important finding is the indication that several alternative policies can be applied at either the watershed or the farm level and without regard to the farms' proximity to the reservoir, with very little difference in results.
W75-06079

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W75-06180

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06181

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
Available from National Technical Information Service, U.S. Department of Commerce, Springfield, Va 22161, as EIS-OH-73-0963-F, $5.75 in paper copy, $2.25 in microfiche. June 1973. 140 p, 9 fig, 1 tab.

Descriptors: Environmental effects, *Ohio, *Wild River Act, *Environmental control, *Governmental interrelations, Rivers streams, Ecology, Environment, Legislation, Tributaries, Legal aspects, River systems, Water quality control, Non-structural alternatives, Federal government, Water pollution control, State governments, Water resources development, Comprehensive planning, Conservation, Water law, Water policy, Administrative agencies, River regulation, Water conservation, Wildlife conservation.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Wilderness areas, State policy, *Little Miami River(Ohio).

This proposal calls for the inclusion of a 64 mile segment of the Little Miami River and a 2 mile segment of a tributary, Caesars Creek, in the national wild and scenic rivers system to be administered by the State of Ohio. Such inclusion would be contingent upon application by the state, which would include a development plan and a commitment by the state to protect the river in perpetuity. This action would have the overall beneficial effect of assisting in the preservation and improvement of the quality of the river and adjoining lands. The adverse effect would be that certain commercial and residential uses of the area which might otherwise occur would be precluded. Other alternatives considered were no action and inclusion of a larger segment of the river. The 64 mile segment was selected because it was the only portion of the river which met the minimum criteria for inclusion in the national system. This proposal would entail no irretrievable commitment of resources and faces no significant opposition. (Deckert-Florida)
W75-06182

WATERSHED BEHAVIOR UNDER CONTROLLED SIMULATED RAINFALL,
Pennsylvania State Univ., University Park. School of Forest Resources.
For primary bibliographic entry see Field 2A.
W75-06192

A METHOD OF PREDICTING INCREMENTAL RUNOFF SEQUENCES,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06194

THE EFFECTS OF PHYSIOGRAPHY AND CLIMATE ON UNIT HYDROGRAPHS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06196

OPTIMAL ANTECEDENT PRECIPITATION INDICES FOR SMALL EASTERN WATERSHEDS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 2A.
W75-06201

BED MATERIAL SIZE CHANGES AND SEDIMENT TRANSPORT,
Agricultural Research Service, Tucson, Ariz. Southwest Watershed Research Center.
For primary bibliographic entry see Field 2J.
W75-06281

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2A.
W75-06286

THE WATER BALANCE OF AN EXCEPTIONALLY WET CATCHMENT AREA IN WEST AFRICA,
Edinburgh Univ. (Scotland). Dept. of Forestry and Natural Resources.
For primary bibliographic entry see Field 2A.
W75-06292

CHEMICAL SOIL STABILIZERS FOR SURFACE MINE RECLAMATION,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. T. Plass.
In: Highway Research Board Special Report 135, Soil Erosion: Clauses and Mechanisms; Prevention and Control, p 118-122. Proceedings of Conference Workshop, January 26, 1973, Washington, D.C. 1 fig, 2 tab.

Descriptors: *Strip mines, *Vegetation establishment, *Mulching, *Soil stabilization, Legumes, Grasses, Erosion control.
Identifiers: *Chemical soil stabilizers, *Mine reclamation.

Successful stabilization of surface mine spoils and other drastically disturbed areas depends on the establishment of a grass and legume cover. Mulches and soil stabilizers may be used on these sites to help establish vegetation and reduce erosion. The selection of an appropriate mulch or soil stabilizer is complicated by the number of products that are commercially available and by the scarcity of information on their effectiveness. Two cooperative demonstrations compared vegetation establishment and erosion loss following 30 treatments with 6 mulches and 12 soil stabilizers. There is no evidence that these materials are necessary for vegetation establishment; they are used primarily to control erosion. Mulch, soil stabilizers and soil stabilizers-mulch treatments were effective. (Vogel-Forest Service)
W75-06330

ALL-SEASON SEEDING OF HERBACEOUS VEGETATION FOR COVER ON APPALACHIAN STRIP-MINE SPOILS,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. G. Vogel.
In: Second Research and Applied Technology Symposium on Mined-Land Reclamation, , 175-188, October 22-24, 1974, Louisville, Kentucky. National Coal Association, 1130 17th Street, NW, Washington, D.C., 2 fig, 5 tab.

Descriptors: *Strip mines, *Vegetation establishment, *Planting management, *Kentucky, Appalachian mountain region, Canopy, *Grasses.
Identifiers: *Herbaceous vegetation.

Mixtures of temporary (quick cover) and long-lived (permanent) herbaceous species were shown periodically throughout the year on strip-mine spoils in eastern Kentucky. Fair to excellent vegetative cover was established usually within 45 to 60 days after seeding from March 1 to October 15, although establishment was a little slower for some of the seedings made in July and August. Seedings in December and February were less successful than those in March and April. Initial cover was most rapidly provided by the temporary species, but the permanent species, Ky-31 fescue and sericea lespedeza, composed most of the ground cover after two to three growing seasons. Balbo rye and annual ryegrass provided quickest cover for early spring and fall seedings. The summer annuals, pearl millet and Sudangrass-sorghum hybrid provided quickest cover from mid-May to mid-July. Rainfall patterns in eastern Kentucky are such that, even in summer, seeding can be expected to succeed more often than fail. Vegetation was established quicker, and the cover was as much as eight times more dense on spoils that were roto-tilled before seeding than on spoils that were not tilled. Seedbed preparation is essential for successful establishment of seeded vegetation. (Forest Service)
W75-06331

SEDIMENT YIELD FROM STRIP-MINED WATERSHEDS IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Second Research and Applied Technology Symposium on Mined-Land Reclamation, October22-24, 1974, Louisville, Kentucky. National Coal Association, Washington, D.C., p 88-100, 7 fig, 6 tab, 7 ref.

Descriptors: *Strip mines, Sediments, *Vegetation establishment, Erosion control, *Kentucky, *Watersheds(Basins), Measurement, *Sediment yield, *Erosion rates.

Measurements of sediment accumulation in debris basins below surface-mined lands in eastern Ken-

tucky show highest sediment yield during the first six months after mining. The erosion rate diminishes to fairly low levels within three years. Methods of mining and handling spoil affect sediment yield, as does the speed with which vegetative cover is established. (Forest Service)
W75-06332

ESTABLISHING FOREST ON SURFACE-MINE LAND AS RELATED TO FERTILITY AND FERTILIZATION,
Forest Service (USDA), Kingston, Pa. Northeastern Forest Experiment Station.
M. M. Czapowskyj.
In: Forest Fertilization Symposium Proceedings, p 132-139. 1973 1 tab, 32 ref. General Technical Report NE-3.

Descriptors: *Strip mines, *Appalachian Mountain region, *Soil chemical properties, Fertility, Fertilization, Trees, Toxicity.

Planted and seeded forest trees respond strongly to application of N and P both singly and in combination. Certain spoils will respond to K application. Application of lime is generally effective in alleviating acidity and toxic concentrations of metals such as Mn, Fe, Zn, and A1. Most spoils can be reforested by proper treatment. (Curtis-Forest Service)
W75-06337

5. WATER QUALITY MANAGEMENT AND PROTECTION

5A. Identification Of Pollutants

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05914

NUTRIENT BUDGET OF A DOUGLAS-FIR FOREST ON AN EXPERIMENTAL WATERSHED IN WESTERN OREGON,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2K.
W75-05923

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. L. Fredriksen.
In: Proceedings of a Symposium Forest Land Uses and Stream Environment, October 19-21, 1970, Oregon State Univ., Corvallis, p 125-137, August 1971. 6 fig, 4 tab, 19 ref.

Descriptors: *Water quality, *Nutrient removal, *Nitrogen, *Sediments, Wood wastes, Water quality standards, Cations, Nitrogen compounds, *Douglas fir trees.

The loss of nutrients from an old-growth Douglas-fir forest was measured in the streams of experimental watersheds. Following timber harvest and slash burning, loss of nutrients cations increased 1.6 to 3.0 times the loss from the undisturbed watershed. A surge of nutrients that followed broadcast burning contained concentrations of ammonia and manganese that exceeded Federal water quality standards for a period of 12 days. Annual nitrogen loss following burning averaged 4.6 pounds per acre; 53 percent of this was organic nitrogen contained in sediment. Inorganic nitrogen, dissolved in the stream, made up the remaining part. Annual loss of nitrogen from the undisturbed forest was very small -- .16 pound per acre. (Forest Service)
W75-05927

THE ENTRY AND FATE OF FOREST CHEMICALS IN STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05928

TOXICITY OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN AQUATIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 5C.
W75-05929

ARSENIC LEVELS IN URINE OF FOREST WORKERS APPLYING SILVICIDES,
Forest Service (USDA), Corvallis, Oreg. Forestry Sciences Lab.
R. F. Tarrant, and J. Allard.
Archives of Environmental Health, Vol 24, p 277-280, April 1972. 5 tab, 3 ref. PNW-1602.

Descriptors: *Herbicides, *Arsenicals(Pesticides), *Silviculture, *Public health, Application methods, *Urine, *Pollutant identification, *Pesticide residues.
Identifiers: Cacodylic acid, Arsenic excretion in urine.

Forest tree thinning workers absorb arsenic from silvicides. Much of the chemical appears to be excreted from the body in a short time. There appears to be no evidence of a continuing increase in arsenic levels over a period of more than two months. Persons using these materials should be trained to observe all necessary precautions to minimize their exposure. (Forest Service)
W75-05930

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
G. M. Aubertin.
Presented at 1973 Proc. Symposium on the Use of Small Watersheds in Determining Effects of Forest Land Use on Water Quality. May 22-23, 1973. Univ. of Kentucky. 9 p, 3 ref.

Descriptors: *Water analysis, Water chemistry, *Water quality, *Sampling, Data collections, *Forest watersheds, *Monitoring, Pollutant identification, *Streamflow.

The various aspects of sampling streamflow from forested watersheds are reviewed. Sampling procedures are emphasized; and the need for accurate water quality data is stressed. (Forest Service)
W75-05931

DDT RESIDUES IN FOREST FLOOR AND SOIL AFTER AERIAL SPRAYING, OREGON--1965-68,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05936

THE INDICATOR ORGANISMS AND THEIR ECOLOGICAL VARIABILITY,
Water Economics Research Inst., Krakow (Poland). Dept. for Water Protection.
L. Turoboyski.
Acta Hydrobiol. Vol 15, No 3, p 259-274, 1973.

Descriptors: *Bioindicators, *Benthic organisms.

A number of indicator species of plant and animal organisms of the micro- and macro-benthos from various rivers were selected, their zonal association and resistance. It was possible to estimate the amount of bacteria in the production of the Barbillon pond (France) during some months of the year; if the quantity in April is taken as a mean value from April to Oct. (9.83 mgC/cu m/day) while disregarding production for the other months of the year, about 22 kg of carbon was the total for the pond and for the year, 18 kg/ha/yr, which represents 1.3% of the algal primary production.--Copyright 1974, Biological Abstracts, Inc.
W75-05970

NITRIC OXIDE, WATER VAPOR, AND OZONE IN THE ATMOSPHERE AS MEASURED IN SITU FROM AN AIRCRAFT,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
D. Briehl, B. A. Ridley, E. Hilsenrath, and H. I. Schiff.
Available from the National Technical Information Service, Springfield, Va 22161 as NASA TMX-3174, $3.25 in paper copy, $2.25 in microfiche. Technical Memorandum X-3174, January 1975. 10 p, 2 fig, 8 ref.

Descriptors: *Air pollution, *On-site investigations, *Instrumentation, Ozone, Water vapor, Pollutants, *Pollutant identification, Measurement, On-site data collections, Nitrogen compounds, Aircraft.
Identifiers: *Nitric oxide, Upper atmospheric air quality.

As part of the instrument evaluation plan for the NASA Global Atmospheric Sampling Program, prototype instruments were tested aboard the NASA Convair 990 during four flights in January and February of 1974. All the data were taken in maritime air between Hawaii and San Francisco and between Hawaii and 155 degrees W, 35 degrees N. A chemiluminescent instrument was used to measure nitric oxide. Readings ranged from less than or equal to 0.05 ppbv, the limit of detectability of the instrument, to 0.41 ppbv. Water vapor, which was measured by using an aluminum oxide hygrometer, ranged from 5.2 micrograms per gram to saturation. Ozone was measured by an instrument using the ultraviolet absorption technique and ranged up to 235 ppbv. Typical temporal plots of the concentrations of the three constituents are presented. All the constituents showed considerable spatial and day-to-day variation in concentration at each altitude flown. Measurements of the three constituents were made simultaneously at various altitudes between 7.6 and 12.5 km. (Sims-ISWS)
W75-06017

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $4.90. Seminar held at Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, October 1974. 425 p, 2 append.

Descriptors: *Estuarine environment, *Monitoring, *Analytical techniques, *Water quality, Pollutants, *Conferences, Management, Coasts, Estuaries, Aquatic environment, Water pollution, Measurement, Control, Control systems, Data collections, Mathematical models, Model studies, Assay, Algae, Aquatic life, Microorganisms, Bioassay, Laboratory tests, *Methodology, Saline water, Brackish water, Marine microorganisms, Sampling, *Pollutant identification, Pesticides.

The Seminar was organized to assist the Environmental Protection Agency in establishing a basis for common methodological techniques in marine and estuarine water quality management. Focus was on procedures for sampling and analyzing coastal waters involving the physical-chemical, biological, and microbiological disciplines. Objectives were: (1) to serve as a forum for presenting state-of-the-art technology in environmental quality monitoring of saline and brackish waters; (2) to present recent developments in sampling and analysis of these waters; and (3) to clarify and identify problem areas and desirable research goals. (See W75-06021 thru W75-06039) (Humphreys-ISWS)
W75-06020

MATHEMATICAL MODELING AS A FRAMEWORK FOR COASTAL MONITORING,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5B.
W75-06021

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
R. W. Austin.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 23-54, October 1974. 13 fig, 1 tab, 11 ref.

Descriptors: *Turbidity, *Light penetration, *Instrumentation, Estuarine environment, Oceans, Coasts, Monitoring, Optical properties, Opacity, Water quality, Measurement.
Identifiers: *Light scattering, *Light absorption.

Water turbidity, although due primarily to the presence of suspended material with its concomitant scattering, is also affected by absorption. The measurement of turbidity by image extinction methods such as the candle turbidimeter recognizes the effects of scattering (particularly forward scattering) and absorption. Most of the presently used nephelometric techniques for assessing turbidity in water ignore the effect of absorption and make a turbidity determination proportional to the volume scattering function at some large angle (or range of angles) from the direction of propagation. For all optical measurements, the instruments should be calibrated in accepted, absolute physical units and careful attention should be given to the spectral range of the radiation involved. Both absorption and scattering are wavelength dependent and the results of the measurements and the conclusions drawn may depend upon the spectral response of the instruments used. Furthermore, a potentially significant characteristic for the study of water quality is neglected if the spectral dependence of these coefficients is not utilized. (See also W75-06020) (Sims-ISWS)
W75-06022

SURFACE SLICKS AND FILMS - A NEED FOR CONTROL,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
W. F. Rittall.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 55-71, October 1974. 2 fig, 16 ref.

Descriptors: *Air-water interfaces, *Pollutants, *Films, Water quality, Outfall sewers, Surfaces, Sampling, Methodology, Oceans, Sewerage, Sewage disposal, Coliforms, Water pollution control.
Identifiers: Surface slicks.

Experimental and field data available in the literature have shown that surface concentrations of films, slicks, and particulates are important factors in effective pollution control. Ocean outfalls have been shown to be possible sources and existing water quality regulations have been questioned as to their control effectiveness. Nonuniformity in sample collection and analyses was identified as one of the more critical areas needing attention, a need that should go hand-in-hand with the establishment of quantitative regulations. Candidate methods for the standardization of field collection procedures were presented for: surface slicks, surface bacteria, and micro and floating particulates. (See also W75-06020) (Sims-ISWS)
W75-06023

A SYSTEMS APPROACH TO MARINE POLLUTION MONITORING,
Washington Univ., Seattle. Dept. of Oceanography.
S. P. Pavlou, T. E. Whitledge, J. C. Kelley, and J. J. Walsh.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 72-107, October 1974. 27 fig.

Descriptors: *Monitoring, *Water pollution, *Sampling, *Data processing, Water pollution sources, Pollutants, Investigations, Chemical analysis, Bioindicators, Ammonia, Nitrates, Phosphates, Silicates, Wastes, Temperature, Salinity, Pollutant identification, Outfall sewers, Sewage disposal, Coasts, Ships, Measurement, Analytical techniques, Computers, Instrumentation, Equipment.

An integrated sampling, data acquisition, and data reduction system was described. This shipboard system provides for coordinated sampling of many physical, chemical, and biological parameters. Many of these measurements are automatically processed by a computer system on the ship. Some preliminary results were presented for the OUTFALL-II studies of the coastal waters off Los Angeles. The major objectives of these investigations were to evaluate the extent of the submerged sewage field, to assess the degree to which the dispersive field might influence the biological productivity of the area, and to determine whether the sewage field is affected by upwelling. Ammonium was a good tracer for the discharge effluent because of low natural background and high concentrations in the discharged effluent. Ammonium concentrations of five times the normal, twice the maximum oceanic values, were observed in areas where no discontinuities in the temperature, salinity, silicate, or phosphate fields were found. Data collected on OUTFALL-II also showed upwelling to be an important process involved in the performance of a sewage outfall. (See also W75-06020) (Sims-ISWS)
W75-06024

METHODS AND PROBLEMS IN ANALYSIS OF PESTICIDES IN THE ESTUARINE ENVIRONMENT,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
A. J. Wilson, Jr., and J. Forester.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 108-125, October 1974. 1 fig, 6 tab, 17 ref.

Descriptors: *Pesticides, *Chemical analysis, *Chlorinated hydrocarbon pesticides, *Analytical techniques, Insecticides, Bioassay, Water quality, Estuarine environment, Quality control, Laboratory tests, Oceans, Pollutant identification, DDT, Chemistry, Mollusks.

The Gulf Breeze Environmental Research Laboratory has been conducting research on the effects of pesticides in the marine environment since 1958. From 1965 until 1972 over eight thousand samples were analyzed for the National Pesticide Monitoring Program. Described were analytical methods employed, some recent studies in water analysis, and the need for adequate analytical quality control in marine monitoring. (See also W75-06020) (Sims-ISWS)
W75-06025

BIOLOGICAL PROBLEMS IN ESTUARINE MONITORING,
Environmental Protection Agency, Gulf Breeze, Fla. Gulf Breeze Environmental Research Lab.
P. A. Butler.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 126-138, October 1974. 2 tab, 20 ref.

Descriptors: *Bioassay, *Bioindicators, *Pollutant identification, *Monitoring, Aquatic animals, Sampling, Fish, Data processing, Silversides, Mollusks, Estuarine environment, DDT, Pollutants, Chemical analysis.
Identifiers: *Organochlorine.

Bivalve molluscs are efficient bioassay tools for identifying the ebb and flow of pollutants in surrounding waters. Monitoring data indicated the movement of relatively discrete masses of clean and polluted water through the estuary. Organochlorine residues in molluscs fluctuated from month to month in response to the sometimes transitory nature of the pollution, and contrasted sharply at times with residues observed in other elements of the associated biota. Successful monitoring of the estuarine environment for persistent organochlorine pollutants is dependent in large measure on the collection of appropriately biased samples. Statistically randomized sample collections are unsatisfactory for the simple reason that pollution patterns are not random. Sample collection protocols, as well as analytical procedures, must be sufficiently standardized to ensure the comparability of data. Monitoring data must be transmitted on a timely basis to action agencies. (See also W75-06020) (Sims-ISWS)
W75-06026

DETERMINATION OF METALS IN SEA WATER,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
D. H. Kampbell.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 139-155, October 1974. 4 tab, 33 ref.

Descriptors: *Metals, *Sea water, *Analytical techniques, Chemical analysis, Measurement, Physical properties, Absorption, Spectroscopy, Sampling, Methodology, Instrumentation, *Pollutant identification, X-ray spectroscopy, Electrochemistry, Laboratory tests, Oceans.

Analytical methods were described to determine As, Be, Cd, Cr, Co, Cu, Fe, Pb, Mn, Hg, Mo, Ni, Se, Ag, V, and Zn in sea water. Analysis of all metals can be accomplished with various degrees

of convenience by atomic absorption. Direct analysis by flameless atomic absorption has many desirable attributes, but utilization cannot be maximized until the interfering action of sea water components is overcome. Anodic stripping voltammetry is becoming increasingly useful for sea water analysis. Direct measurements for Cd, Cu, Pb, and Zn have been made. Major ions in sea water do not interfere. Neutron activation analysis and spark source mass spectrometry have been utilized as analytical techniques. Gas chromatography has possible applications for sea water metal analysis. (See also W75-06020) (Sims-ISWS)
W75-06027

RECENT STUDIES ON BIOLOGICAL EFFECTS OF CRUDE OILS AND OIL-DISPERSANT MIXTURES TO RED SEA MACROFAUNA,
National Marine Water Quality Lab., West Kingston, R.I.
For primary bibliographic entry see Field 5C.
W75-06028

ADSORPTION OF ORTHOPHOSPHATE ON BOROSILICATE AND 'CITRATE OF MAGNESIA BOTTLES' POLYETHYLENE AND POLYVINYL SURFACES IN A DISTILLED WATER AND SEAWATER MATRIX,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
D. F. Krawczyk, and M. W. Allen.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 180-193, October 1974. 8 tab, 10 ref.

Descriptors: *Water sampling, *Oceanography, *Chemical analysis, Laboratory equipment, Adsorption, Sampling, Chemicals, Phosphorus compounds, Plastics, Sea water, Water analysis, Water pollution, *Pollutant identification.
Identifiers: Sample bottles, Sample storage, *Orthophosphates, Glass bottles, Plastic bottles.

Adsorption or loss of orthophosphate in glass bottles does not seem to be a problem at a low orthophosphate concentration in a distilled water matrix up through seven days. However, glass bottles must have proper acid treatment to be satisfactory containers for low phosphate water samples because of leaching of a constituent that provides a positive phosphate reaction. In seawater, losses of orthophosphate phosphorus were noted after a sixteen day period in polyethylene bottles. If mercuric chloride is added to seawater, polyethylene bottles can be used for holding samples for orthophosphate analysis without any pretreatment (e.g., acid washing, washing, and rinsing). Polyvinyl chloride bottles can be used as seawater sample storage containers as received from the supplier without any pretreatment. Borosilicate glass bottles must be acid washed and thoroughly rinsed before holding samples for orthophosphate analysis. (See also W75-06020) (Sims-ISWS)
W75-06029

DEVELOPMENT OF A STANDARD MARINE ALGAL ASSAY PROCEDURE FOR NUTRIENT ASSESSMENT,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
D. T. Specht, and W. E. Miller.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 194-230, October 1974. 19 fig, 4 tab, 42 ref.

Descriptors: *Pollutant identification, *Bioassay, *Algae, *Nutrients, *Laboratory tests, Testing, Analytical techniques, Water analysis, Aquatic life, Aquatic plants, Marine biology, Marine algae, Phosphorus compounds, Nitrogen compounds, Nutrient requirements, Estuarine environment, Testing procedures, Methodology.

The effort to design and evaluate a marine version of the 'Algal Assay Procedure: Bottle Test' has resulted in the establishment of the suitability of Dunaliella tertiolecta Butcher (DUN clone) as a highly versatile and consistent bioassay organism for nutrient assessment in marine, estuarine, and some freshwater situations. The response of this organism to salinity, temperature, light, and nutrients was evaluated in the laboratory. The procedures were then applied to samples taken from a variety of estuarine sites along the Oregon coast and from Albert Lake in southeastern Oregon. The results of these tests were reported. (See also W75-06020) (Sims-ISWS)
W75-06030

MONITORING SEAWATER FOR RADIONUCLIDES,
Environmental Protection Agency, Cincinnati, Ohio. Radiochemistry and Nuclear Engineering Branch.
B. Kahn, and D. M. Montgomery.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 231-241, October 1974. 1 tab, 33 ref.

Descriptors: *Radioactivity, *Monitoring, *Sea water, *Oceanography, Measurement, Fallout, Radioactive wastes, Analytical techniques, Pollutants, *Pollutant identification, Tracers, Methodology.

An acceptable radiological monitoring program can be prepared on the basis of extensive experience with both routine programs and research concerning radionuclide transport in the marine environment. Many difficulties must be considered: those common to most marine monitoring programs, those associated with the chemical state of the major radionuclides in effluents (including their extremely low concentration), and those related to measuring numerous radionuclides at very low levels. Participation in the program by appropriate specialists is a necessity, and use of only an oceanographer or a radiochemist when both are needed usually leads to initially unrecognized difficulties. (See also W75-06020) (Sims-ISWS)
W75-06031

METHODS FOR MONITORING RADIOACTIVITY IN AQUATIC BIOTA,
Washington Univ., Seattle. Coll. of Fisheries.
V. A. Nelson, W. R. Schell, and A. H. Seymour.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 242-258, October 1974. 2 fig, 28 ref.

Descriptors: *Radioactivity, *Monitoring, *Aquatic animals, Radioactive wastes, Fallout, Pollutants, *Pollutant identification, Analytical techniques, Oceanography, *Methodology, Measurement, Biota, Aquatic life, Fish, Laboratory tests.

Monitoring for radioactivity in aquatic biota was discussed and pertinent literature concerning monitoring radioactivity in the aquatic environment was reviewed. The critical pathway and specific activity approaches to sampling were discussed. Two monitoring programs, and sample collection, sample handling, chemical procedures, and radiometric equipment used in monitoring programs now in progress at the Laboratory of Radiation Ecology, University of Washington were outlined. (See also W75-06020) (Sims-ISWS)
W75-06032

THE PROPERTIES AND COMPOSITION OF SLUDGES,
National Environmental Research Center, Ohio. Advanced Waste Treatment Research Lab.
R. B. Dean, and J. E. Smith, Jr.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 259-274, October 1974. 1 fig, 6 tab, 30 ref.

Descriptors: *Pollutant identification, *Sludge, Waste treatment, *Sewage treatment, *Sewage effluents, Chemical properties, Statistical methods, Physical properties, Biological properties, Aeration, Aerobic treatment, Anaerobic digestion, Trickling filters, *Waste water treatment, Sewage lagoons, Municipal wastes.

The general characteristics of sludges produced at the various stages of waste treatment processes were discussed. The quantities of typical sludges as they are removed from clarifier tanks or thickeners were shown. The chemical and biological composition of sludges was reported, along with the physical characteristics of the sludge. The composition of sludges varies so much that meaningful data can only be obtained by applying appropriate statistical methods. The variance and the spread are as important as the average and the geometric mean, and conclusions based on a few spot analyses are likely to be misleading. Obtaining a representative set of samples is perhaps even more important than choosing the best method of analysis. (See also W75-06020) (Sims-ISWS)
W75-06033

MAKING ARTEMIA SLUDGE BIOASSAY MORE ECOLOGICALLY RELEVANT,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
R. J. Nadeau, and B. J. Pastalove.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 275-302, October 1974. 10 fig, 3 tab, 10 ref.

Descriptors: *Pollutant identification, *Bioassay, *Sludge, *Plankton, Methodology, Ecology, Zooplankton, Coasts, Oceans, Sewage disposal, Wastes, Sludge disposal, Aquatic microorganisms, Marine animals, Copepods.
Identifiers: *Artemia salina.

Comparative experiments using recommended bioassay procedures for Artemia nauplii and endemic microcrustacean zooplankton illustrated that endemic species have a greater sensitivity to municipal sewage sludge than have Artemia nauplii. It was also shown, based upon these results, that the allowable concentration may be too high to prevent impact upon the plankton in the mixing zone. In this case, the criteria may not be sufficient to prevent damage, both lethal and sublethal, to the organisms first exposed to the dumped materials, namely, the microcrustacean populations. To increase the value of the bioassay criteria for protecting the marine ecosystem from the impact of disposed materials, sensitivity factors must be determined for additional endemic species. These sensitivity factors could then be applied to the toxicity values derived from the Artemia bioassay to increase the use of these bioassays as a device for protecting the ecology of coastal waters. (See also W75-06020) (Sims-ISWS)

W75-06034

MONITORING DREDGE SPOILS,
Oregon State Univ., Corvallis. Dept. of Civil Engineering.
L. S. Slotta, and K. J. Williamson.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 303-316, October 1974. 1 tab, 24 ref.

Descriptors: *Pollutant identification, *Dredging, *Environmental effects, *Monitoring, Spoil banks, Turbidity, Suspended solids, Waste disposal, Slurries, Nutrients, Estuaries, Estuarine environment.

An interdisciplinary team has been conducting research on the environmental effects of dredging in estuarine waters. The potential acute and chronic environmental impacts of dredging, examined as part of this study were reported. Present monitoring technology is available to measure many parameters in relation to dredging projects. More research is necessary to elucidate cause and effect relationships especially in relation to chronic impacts. Proposed guidelines to minimize the acute impacts and identification of research needs to effectively monitor dredging projects were also presented. (See also W75-06020) (Sims-ISWS)
W75-06035

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
R. C. Swartz, W. A. DeBen, and A. J. McErlean.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 317-334, October 1974. 16 fig, 1 tab, 27 ref.

Descriptors: *Pollutant identification, *Estuarine environment, *Demersal fish, *Crustaceans, *Monitoring, Trawling, Coasts, Estuaries, Aquatic animals, Density, Varieties, Distribution patterns, Fish, Crabs, Shrimp, Temporal distribution, Sampling, Spatial distribution, Pollutants, Oregon.
Identifiers: Faunal density, Species richness, Affinity index.

The structure of marine communities is frequently used as an indication of the environmental consequences of pollution. Prevention of major ecosystem alterations necessitates monitoring programs that can detect subtle changes before irreversible damage has occurred. Data analysis procedures should therefore be sensitive to relatively minor differences in biological conditions. The objective of most marine monitoring programs conducted by regulatory agencies is to document changes in biological conditions that can be correlated with water quality or other pollution parameters. It was demonstrated that many characteristics of the biota should be examined. No single index is sufficient. Total faunal density, species richness, evenness, and an affinity index were helpful in describing closely related demersal communities. Differences in the spatial-temporal distribution of individual species populations provided the most obvious discrimination between collections. (See also W75-06020) (Sims-ISWS)
W75-06036

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
R. R. Colwell.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 335-359, October 1974. 17 fig, 13 ref. NSF Grant GA-36235.

Descriptors: *Pollutant identification, *Microbiology, *Equipment, *Sampling, *Oceanography, Methodology, Marine biology, Marine microorganisms, Marine bacteria, Marine animals, Microbial degradation, Estuarine environment, Sediments, Cores, Bottom sampling, On-site data collections, Aquatic life, Aquatic microorganisms.

The equipment and facilities for collecting water, sediment, and biota for microbiological analyses were examined, described, and found to be relatively primitive. Sampling technology must be perfected and new methods developed. Environmental microbiological monitoring cannot yet be accomplished with the degree of sophistication required by the complex and complicated demands made of those charged with that task. (See also W75-06020) (Sims-ISWS)
W75-06037

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
V. J. Cabelli, F. T. Brezenski, A. P. Dufour, and M. A. Levin.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 360-384, October 1974. 4 fig, 12 tab, 32 ref.

Descriptors: *Pollutant identification, *Microbiology, *Methodology, *Marine microorganisms, *Pathogenic bacteria, Sewage sludge, Industrial wastes, Coliforms, E. coli, Streptococeus, Salmonella, Microorganisms, Sewage bacteria, Shigella, Enteric bacteria, Laboratory tests, Water pollution, *Monitoring, Estuarine environment.

The sources of pathogenic microorganisms in the marine environment were discussed. The status of microbial methodology was examined. This methodology is in need of upgrading. The situation stems from several factors: (1) a paucity of epidemiological data relating health hazards to individuals associating with the marine environment to some indicator or indicators of the water quality; (2) insufficient evaluation of existing methodology when applied specifically to the enumeration of the organism in the marine environment; and (3) the willingness, in the past, to rely too heavily on coliforms, even fecal coliforms, as the sole indicators of water quality. (See also W75-06020) (Sims-ISWS)
W75-06038

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
J. D. Buck.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 385-406, October 1974. 144 ref.

Descriptors: *Pollutant identification, *Reviews, *Bibliographies, *Microbiology, *Marine microorganisms, *Monitoring, Documentation, Microorganisms, Phytoplankton, Bacteria, Viruses, Marine bacteria, Methodology, Bioassay, Bioindicators, Measurement, Laboratory tests, Sewage effluents, Oil spills, Estuarine environment, Heavy metals, Oceanography, Ecology.

A review of existing methodology in the field of monitoring the marine microorganisms includes many subareas of interest. These include observations of biomagnification in bacteria, effects of oil spills and sewage effluents, use of microbiology to indicate pollutants, microbial diseases in fish and shell fish, and methods of testing and measuring. The importance of microorganisms as indicators of environmental alteration was stressed. (See also W75-06020) (Sims-ISWS)
W75-06039

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
N. L. Guinasso, Jr.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 650, $4.25 in paper copy, $2.25 in microfiche. Report No. CG-D-4-75, August 1974. 64 p, 11 fig, 8 tab, 32 ref. DOT-CG-24,224-A.

Descriptors: *Pollutant identification, *Harbors, *Water pollution, *Monitoring, Mathematical models, Model studies, Water circulation, Currents(Water), Estuaries, Salinity, Pollutants.
Identifiers: Galveston Harbor.

Available data on the hydrodynamics of Galveston Harbor do not provide a firm basis for the prediction of pollutant transport and dispersion in the harbor. Field measurements of the hydrodynamics of the harbor should be undertaken and should be designed to test the validity of existing mathematical and physical models of the harbor. Needed improvements of existing mathematical models of Galveston Harbor include an increase of the horizontal resolution and treatment of vertical density stratification. A pollution monitoring system should include regular surveillance, fixed monitoring stations, and cooperation with local agencies. (Sims-ISWS)
W75-06040

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
A. R. Abernathy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 857, $4.25 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 52, February, 1975. 52 p, 5 fig, 12 tab, 43 ref, append. OWRT A-029-SC(2).

Descriptors: Spectroscopy, *Color, Measurement, Methodology, *Pollutant identification, *Photometry, *Analytical techniques, Waste water treatment, Monitoring, Industrial wastes, Water analysis.
Identifiers: Color measurement, Color standards.

A simple method for measuring dissolved color in water and wastewater was developed and tested. This method was compared to other methods and agree well with visual comparisons and tristimulus determinations. The method, which employs an abbreviated tristimulus filter photometer using only the green filter, could be useful in measuring color reductions by wastewater treatment, monitoring colored waste discharges, and in establishing allowable limits for color additions to surface waters.
W75-06086

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06088

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-06092

SPECTROANALYTICAL PARAMETERS OF FUNGAL METABOLITES. IV. MONILIFORMIN,
Auburn Univ., Ala. Dept. of Chemistry.
J. A. Lansden, R. J. Clarkson, W. C. Neely, R. J. Cole, and J. W. Kirksey.
Journal of the Association of Official Analytical Chemists, Vol 57, No 6, p 1392-1396, November 1974. 4 fig, 13 ref. OWRT A-035-ALA (4).

Descriptors: *Pollutant identification, Bioassay, *Water quality, Aqueous solutions, Fluorescence, Analytical techniques, Fungi, Spectrophotometry, Chromatography.
Identifiers: Southern corn blight, *Fungus metabolites, Emission spectra, Phosphorescence, Dimer, *Moniliformin.

The spectral data for a novel fungal metabolite, moniliformin (Potassium salt of 1-hydroxycyclobut-1-ene-3,4-dione), are reported. The corrected ambient temperature fluorescence excitation and emission spectra are given and the quantum efficiency is calculated to be 0.00532. The uncorrected low temperature phosphorescence emission spectrum and lifetime are also reported. Other physical data are given to support spectral evidence that the molecule exists as a dimer in aqueous solutions.
W75-06093

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 2K.
W75-06122

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
W. R. McCluney.
Journal Water Pollution Control Federation, Vol 47, No 2, p 252-266, February 1975. 3 fig, 36 ref.

Descriptors: *Turbidity, *Optical properties, *Instrumentation, *Analytical techniques, Water properties, Absorption, Hydrology, Physical properties, Light penetration, Secchi disks, Water quality, Water analysis, Laboratory tests, On-site tests, Refractivity, Light intensity, Measurement, Suspended solids.
Identifiers: Turbidimeters, *Radiometry, Transparency, Scattering, Nephelometry.

An examination of a number of turbidity measurements reported in the literature revealed considerable variability in the definitions, units, and measurement techniques used. Many of these measurements differ radically in the optical quantity measured. The radiometric basis for each of the most common definitions of turbidity was examined. Several commercially available turbidimeters were described, and their principles of operation were evaluated radiometrically. It was recommended that the term turbidity be restricted to qualitative estimates of water clarity and that all turbidimeters be calibrated so that their measurements are made in terms of the fundamental absorption and scattering parameters of hydrologic optics. (Henley-ISWS)
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 2K.
W75-06136

MASS SPECTROMETRY AS USED TO DETERMINE TRACE ORGANIC CONSTITUENTS IN AQUATIC SYSTEMS,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
J. M. Pierce.
Available from the National Technical Information Service, Springfield, Va 22161, as ORO-4254-23. Spring 1974. 20 p, 10 fig, 10 tab, 12 ref.

Descriptors: *Pollutant identification, *Mass spectrometry, *Organic compounds, *Instrumentation, *Analytical techniques, *Spectrometers, Water analysis, Analysis, Spectroscopy, Water quality, Measurement, Chemical analysis, Chemical properties, Physical properties, Spectrophotometry, Aquatic environment, Oil wastes, Solvents.
Identifiers: Cleaning fluids, Structural analysis, Fragmentation patterns.

A simplified component approach to the way a mass spectrometer functions was presented. Mass spectrometry is capable of determining the molecular weight and often the complete structure of organic compounds. For this reason, mass spectrometry is evolving as a major research tool in water analysis for trace organic compounds. Compounds are identical if they have identical physical properties, such as melting point, boiling point, density, refractive index, etc. The greater the number of physical properties measured, the stronger the evidence. A single mass spectrum of an organic compound amounts to dozens of physical properties because it shows the relative abundances of dozens of different fragments. For this reason, mass spectral positive determinations are considered to be one of, if not the strongest, proof of identification. Several applications of mass spectrometry to the determination of organic constituents in water were reviewed. (Henley-ISWS)
W75-06188

DETERMINATION OF ORGANIC COMPOUNDS IN AQUATIC SYSTEMS BY HIGH PRESSURE LIQUID CHROMATOGRAPHY,
Oklahoma State Univ., Stillwater. Dept. of Chemistry.
J. Caplinger.
Available from the National Technical Information Service, Springfield, Va 22161, as ORO-4254-18, $4.00 in paper copy, $2.25 in microfiche. (1974). 16 p, 8 fig, 8 tab, 13 ref.

Descriptors: *Chromatography, *Organic compounds, *Analytical techniques, *Instrumentation, *Water quality, Chemical analysis, Mass spectrometry, Aquatic habitats, *Pollutant identification, Laboratory tests, Amino acids, Aromatic compounds, Organic acids, Chemicals, Organic wastes, Solvent extractions, Domestic wastes, Effluents, Freeze drying, Pesticide residues.
Identifiers: *High pressure liquid chromatography, *Trace contaminantes, Vacuum distillation.

High pressure liquid chromatography (HPLC) as a tool in water analysis was discussed. A wide variety of compounds with a wide variety of stationary and mobile phases can be analyzed by HPLC. The mobile phase can range from nonpolar to polar to from acidic to basic, while the stationary phase can range from polar to nonpolar or from cationic to anionic. Gradient elution increases the range of the liquid chromatograph. Multi-detection systems can enhance the versatility of the high pressure liquid chromatograph. Mass spectrometers can be directly coupled with the HPLC for direct identification of the eluted compounds. (Henley-ISWS)
W75-06189

ESTIMATE OF WATER POLLUTION POTENTIAL BASED ON CHARACTERISTICS OF DOMESTIC SEWAGE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.
W75-06202

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 7C.
W75-06208

ENVIRONMENTAL CONTROL LABORATORY DESIGNED FOR THE SPECIFIC NEEDS OF THE INTERN TRAINING CENTER, RED RIVER ARMY DEPOT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
N. H. Trier.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 504, $4.25 in paper copy, $2.25 in microfiche. USAMC Intern Training Center, Red River Army Depot, Texarkana, Texas, Report No. USAMC-ITC-02-08-73-112, March 1974. 48 p, 1 fig, 6 tab, 25 ref, append.

Descriptors: *Laboratories, *Laboratory equipment, *Pollutant identification, Air pollution, Water pollution, Equipment, Research facilities, Facilities, Testing.
Identifiers: Noise pollution.

The types of equipment necessary for establishing an environmental control laboratory at the Intern Training Center at Red River Army Depot, Texarkana, Texas, were researched. Recommended were the various types of equipment needed to sample, detect, and measure three types of pollution: air, water, and noise. This laboratory is needed to supplement course work by familiarizing the students with pollution monitoring equipment through experiments performed in the laboratory. This paper can be used as a basis for the design of such a laboratory. (Sims-ISWS)
W75-06210

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
E. E. LeFebvre.
Available from the National Technical Information Service, Springfield, Va. 22161 as AD-787 211, $3.75 in paper copy, $2.25 in microfiche. Technical Report EHL(K) 74-23, September 1974. 22 p, 1 tab, 2 ref, append.

Descriptors: *Water quality control, *Sewage treatment, *Water sampling, *Waste disposal, Waste water treatment, Waste water disposal, Irrigation programs, Sprinkler irrigation, Water pollution, Water pollution control, *Florida.
Identifiers: *Eglin Air Force Base(Fla).

The water quality surveillance program at Eglin AFB FL was evaluated. Although the base has an excellent program, the entire military reservation is not included. A program for the surveillance of the test areas was suggested along with recommendations for increase in personnel authorizations to accomplish the task. An appendix gives the locations of sampling points and summaries of analyses of water samples and effluent wastewater samples. (Sims-ISWS)
W75-06216

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
J. H. Mayes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 116, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-057, July 1974. 65 p, 20 tab, 34 ref, append. EPA Project R-801159.

Descriptors: *Water pollution sources, *Industrial wastes, *Waste water(Pollution), Waste water treatment, Waste water disposal, Chemical wastes, Water pollution control, Biological treatment, Effluents.
Identifiers: *Pharmaceuticals, Drugs.

A first attempt was presented to categorize the ethical pharmaceutical industry on the basis of manufacturing processes and resulting effluent characteristics. The available information allowed a breakdown into (1) pharmaceutical (formulation) plants, (2) pharmaceutical and chemical (synthesis) plants, and (3) all others (those using fermentation, biological preparation, extraction, and combinations). Analysis of the collected raw effluent data indicated that sanitary wastes were a major contributor in pharmaceutical plants. The wastes of the other categories were more dependent on specific operations and were, consequently, more variable. Fermentation wastes were, as expected, very high in biodegradable organics and usually were the predominant contributor in complex plants. Conventional biological treatment, both in-plant and at central facilities, is widely used and appears capable of achieving 90% removal of degradable organics. Advanced technology appears to be limited in application to specific wastes not amenable to biological treatment. (Sims-ISWS)
W75-06244

INVESTIGATION OF WATER QUALITY PARAMETERS AT SELECTED POINTS ON THE TENNESSEE RIVER,
Alabama A and M Univ., Normal. Dept. of Chemistry.
M. C. Manger.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-29712, $3.75 in paper copy, $2.25 in microfiche. March 1974. 41 p, 6 fig, 27 tab. NASA Grant NGR 01-001-018.

Descriptors: *Tennessee River, *Pollutant identification, *Water quality, *Monitoring, Temperature, Chemical properties, Physical properties, Biological properties, Rivers, Thermal pollution, Powerplants, Electric powerplants, *Alabama, Sampling, Testing, On-site data collections, *Path of pollutants.

Physical, chemical, and biological water quality parameters were investigated at the Widow's Creek Steam Plant on the Tennessee River. The water quality parameters and field site locations were selected so as to be compatable with the interests and needs of the Environmental Application Office at Marshall Space Flight Center. All sampling and testing was conducted as directed in the 13th Edition of 'Standard Methods of Analysis for Water and Waste Water' or as suggested by NASA'S Technical Officer. Data were presented in a form compatible with that presently being collected by other agencies. These data show a definite warming of the river water by the steam–generation plant. The effluent heat is dissipated quickly by a mixing action of the river. The chemical and biological effects are not definitive and warrent further and more complete analysis. (Sims-ISWS)
W75-06248

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
For primary bibliographic entry see Field 5C.
W75-06255

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
M. J. Allen, and E. E. Geldreich.
Ground Water, Vol 13, No 1, p 45-52, January-February 1975. 1 fig, 8 tab, 22 ref.

Descriptors: *Groundwater, *Water quality, *Coliforms, *Bioindicators, Water analysis, Ecosystems, Biological communities, Pathogenic bacteria, Bacteria, Water supply.

Although more than 60 million individuals rely upon the absence of microbial pathogens in their marginally-treated or untreated groundwater supplies, an analysis of reported waterborne disease outbreaks for the period 1946-1970 shows that contaminated groundwater supplies were responsible for over 50% of the outbreaks. Completed groundwater studies indicate: (1) coliforms and fecal coliforms are present in a significant percentage of improperly located or inadequately protected private supplies, and (2) the apparent absence of coliforms due to the insensitivity of currently available bacteriological methods does not preclude pathogen occurrences. Excessive bacterial populations, normally not encountered in finished water, can suppress coliform detection. For this reason, it is essential that improved bacterial detection methods be developed and other criteria for untreated groundwater be explored by comprehensive field investigations and laboratory analysis of groundwater supplies for a variety of bacterial parameters. (Gibb-ISWS)
W75-06259

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
G. Mulamoottil, and R. S. Dorney.
Water Resources Bulletin, Vol 10, No 6, p 1270-1276, December 1974. 2 fig, 3 tab, 3 ref.

Descriptors: *Limnology, *Streams, *Water pollution, Chemical properties, Biological properties, Bacteria, Biochemical oxygen demand, Benthic fauna, Bloodworms, Sludgeworms, Tubificids, City planning, Effluents, Sewage effluents, Urban runoff, *Canada.
Identifiers: *Duffin Creek(Ontario).

Limnological study of Duffin Creek was carried out with the objective of evaluating the impact of the proposed location of Century City. The chemical, biological, and bacteriological parameters of one branch of the Creek, which received tertiary treated effluent, were found to be fairly high. Considering the flow conditions of the Creek in relation to the total discharge of the treated effluent from the proposed Century City, it was recommended that the effluent be piped 3-4 miles downstream. The plan for Century City has since been abandoned. (Sims-ISWS)
W75-06264

QUANTITATION OF ENVIRONMENTAL HYDROCARBONS BY THIN-LAYER CHROMATOGRAPHY, GRAVIMETRY/DENSITOMETRY COMPARISON,
California Univ., Berkeley. Biomedical Research Lab.
L. Hunter.
Environmental Science and Technology, Vol 9, No 3, p 241-246, March 1975. 6 fig, 6 tab, 15 ref.

Descriptors: *Chromatography, *Pollutant identification, *Instrumentation, *Oil pollution, *Analytical techniques, Evaluation, Chemical analysis, Organic wastes, Oil wastes, Investigations, Water pollution, Oil spills, Organic compounds, Aromatic compounds, Solvent extractions, Pollutants, Fuels, Mass spectrometry, Monitoring.
Identifiers: Hydrocarbons, Densitometric method, Infrared absorption, Gravimetric method.

The application of thin-layer chromatography to the detection and analysis of trace amounts of hydrocarbons was investigated. Samples can be separated into saturates (alkanes) and unsaturates (mainly aromatics) at sensitivities to 0.5 micrograms. Quantitations by a densitometric method and by gravimetric recovery of the spots were compared. Comparable accuracy is possible, provided authentic calibration samples are available. In the absence of these samples, quantitation by densitometry is considerably less accurate than gravimetry due to variable hydrocarbon response to the visualization method. (Henley-ISWS)
W75-06276

THE APPLICATION OF ELECTRODEPOSITION TECHNIQUES TO FLAMELESS ATOMIC ABSORBTION SPECTROMETRY PART II. DETERMINATION OF CADIUM IN SEA WATER,
Oslo Univ. (Norway). Dept. of Chemistry.
W. Lund, and B. V. Larsen.
Analytica Chimica Acta, Vol 72, No 2, p 57-62, September, 1974. 1 fig, 1 tab, 7 ref.

Descriptors: *Spectroscopy, *Analytical techniques, *Instrumentation, *Cadmium, Chemical analysis, Testing procedures, Chemical reactions, Metals, *Pollutant identification.
Identifiers: *Flameless photometry.

For the determination of trace metals in sea water by atomic absorption including flameless techniques, a separation procedure has been needed to eliminate interferences arising from light scattering by salt particles in the sample. The determination of cadmium in sea water is described; a technique is used where matrix interferences are eliminated by an electrodeposition step. The results of the analyses had a relative standard deviation of 10%, and the results agreed quite well with the value found by anodic stripping voltametric experiments. A deposition time of 5 min. was necessary to obtain satisfactory peak heights and the total time for a single analysis was about 7 min. Advantages of this method are: (1) avoid contamination of the sample by impurities from organic solvents or ion-exchange resins, (2) improvement of the detection limit over other flameless techniques, (3) no need for drying and ashing steps before atomization, and (4) cheaper equipment needed than that commercially available for flameless atomization. (See also W75-02085) (Pulliam-Vanderbilt)
W75-06301

MOLECULAR EMISSION CAVITY ANALYSIS (MECA) - A NEW FLAME ANALYTICAL TECHNIQUE, PART IV THE DETERMINATION OF ARSENIC AND ANTIMONY,
Birmingham Univ. (England). Dept. of Chemistry.
R. Belcher, S. L. Bogdanski, S. A. Ghonaim, and A. Townshend.
Analytica Chimica Acta, Vol 72, No 1, p 183-187, September, 1974. 4 fig, 13 ref.

Descriptors: *Analytical techniques, *Flame photometry, *Arsenic compounds, *Metals, Testing procedures, Laboratory tests, Chemical analysis, Spectrophotometry, *Pollutant identification.
Identifiers: *Antimony, Molecular emission cavity analysis.

In molecular emission cavity analysis (MECA), the sample is placed within a small cavity at the end of a rod, which is then positioned in a hydrogen-nitrogen flame, so the flame-gas flows almost vertically past the cavity entrance. The sample in the cavity is vaporized and emits band emissions characteristic of the elements in the sample. As or Sb aspirated as the chloride into a hydrogen diffusion flame produced a faint bluish-white emission. Introduction of oxygen into the cavity gave an intense emission restricted within the cavity. To decrease the number of interferences, a volatilization system was applied. As and Sb were reduced by sodium borohydride to arsine and stibine, and the gases were swept into the MECA cavity, placed in a hydrogen-nitrogen diffusion flame, by a slow stream of nitorgen. The intensity of the resulting band emission was recorded as a function of time, and the maximal emission intensity was measured at the appropriate wavelengths. The optimal conditions for As or Sb in aqueous solutions. (Pulliam-Vanderbilt)
W75-06302

AN ANALYTICALLY USEFUL COULOMETRIC GENERATION OF MICRO AMOUNTS OF METAL IONS, PART II. ELECTROGENERATION OF LEAD (II),
Amsterdam Univ. (Netherlands). Lab. for Analytical Chemistry.
T. J. M. Pouw, G. DenBoef, and U. Hannema.
Analytica Chimica Acta, Vol 68, No 1, p 243-246, January, 1974. 2 fig, 1 tab, 1 ref.

Descriptors: *Analytical techniques, *Lead, *Volumetric analysis, *Electrochemistry, Oxidation, Laboratory tests, Testing procedures, *Pollutant identification.

The coulometric preparation of lead (II) ions from liquid lead amalgam was described. The major problem encountered in the preparation was the spontaneous oxidation of lead amalgam during interruptions of the generation current. This spontaneous oxidation was suppressed by a potential of -1.2 V vs. S.C.E. The current efficiency was determined by measuring, at a given generation current, the time needed to convert an accurately known amount of EDTA into the metal complex by means of spectrophotometric indication of the equivalence point. The lead-EDTA complex displayed an absorbance maximum at 242 nm with a molar absorptivity of the order of 9000. The amount of EDTA titrated corresponded to a concentration of the order of 0.000001 M. (Jernigan-Vanderbilt)
W75-06304

CHELATION OF BETA-DICARBONYL COMPOUNDS AND THEIR DERIVATIVES: PART 34 THE USE OF THIOBENZOYLMETHANE FOR THE EXTRACTION AND PHOTOMETRIC DETERMINATION OF TRACES OF THALLIUM AND MERCURY, (IN GERMAN),
Pedagogische Hochschule, Potsdam (East Germany). Sektion Chemie/Biologie.
E. Uhlemann, and B. Schuknecht.
Analytica Chimica Acta, Vol 69, No 1, p 79-84, March, 1974. 5 fig, 2 tab, 12 ref. English summary.

Descriptors: *Separation techniques, *Mercury, *Heavy metals, *Trace elements, *Spectroscopy, Analytical techniques, Lead, Tin, Zinc, Gold, Copper, Nickel, Cobalt, Iron, Manganese, Chromium, Alkali metals, Alkaline earth metals, Fluorides, Chlorides, *Pollutant identification.

Thiodibenzoylmethane is a very suitable ligand for the extraction and spectrophotometric determination of traces of mercury (0.05-0.5 micromol) and thallium (0.1-1.0 micrmol). Both methods are rapid and can be made highly selective by means of masking reagents. The influence of numerous metals, e.g. Ga, In, Pb, Sn, As, Sb, Bi, Cd, Zn, Pd, Ag, Cu, Ni, Co, Fe, Mn, Cr, alkali and alkaline earth metals, and also of anions as fluoride, chloride, bromide, iodide, thiocyanate, sulphide, sulphate, nitrate, EDTA and thioglycolic acid was examined. (Jernigan-Vanderbilt)
W75-06305

CHELATION OF BETA-DICARBONYL COMPOUNDS AND THEIR DERIVATIVES PART 36. THE EXTRACTION AND PHOTOMETRIC DETERMINATION OF CADMIUM WITH THIODIBENZOLYMETHANE IN COMPARISON WITH OTHER SPECIAL REAGENTS, (IN GERMAN),
Paedagogische Hochschule, Potsdam (East Germany). Sektion Chemie/Biologie.
B. Schuknecht, G. Robisch, and E. Uhlemann.
Analytica Chimica Acta, Vol 69, No 2, p 329-334, April, 1974. 2 fig, 2 tab, 21 ref.

Descriptors: *Chelation, *Separation techniques, *Cadmium, *Photometry, Trace elements, Alkaline earth metals, Aluminum, Manganese, Iron, Chromium, Tin, Lead, Copper, Cobalt, Nickel, Gold, Mercury, Zinc, *Pollutant identification.
Identifiers: Thiodibenzoylmethane.

Thiodibenzoylemethane was a suitable reagent for the extraction and photometric determination of traces and cadmium. There was no interference from 10000-fold amounts of alkaline and alkaline earth metals, B, Al, Ga, In, Mn, Fe, Cr, and from 1000-fold amounts of As, Sb, Sn, Pb, Bi, Cu, Co, Ni, or Pd, Ag, Hg, Tl, and Zn were tolerated up to a 100-fold excess. The proposed method was compared with various other possibilities for cadmium determinations. (Jernigan-Vanderbilt)
W75-06306

A STUDY OF THE OPTIMAL CONDITIONS FOR FLAMELESS ATOMIC ADSORPTION SPECTROMETRY OF IRIDUM, PLATINUM AND RHODIUM,
Ghent Rijksuniversiteit (Belgium). Lab. of Analytical Chemistry.
E. Adriaenssens, and P. Knoop.
Analytica Chimica Acta, Vol 68, No 1, p 37-48, January, 1974. 6 tab, 8 fig, 6 ref.

Descriptors: *Metals, *Analytical techniques, Spectroscopy, Reliability, Quality control, *Pollutant identification.
Identifiers: *Atomic absorption spectroscopy, *Iridium, *Platinum, *Rhodium.

The optimal working conditions under which iridium, Platinum and rhodium can be determined with the aid of flameless atomic absorption spectrometry with a Massmann Furnace were examined. The limits of detection were in the range 10 to the minus 9th power - 10 to the minus 10th power g. The influence of acids and mutual interferences was checked. The effect of the sample volume on the atomic absorption signals was related to temperature differences in the graphite tube. Factors affecting reproducibility were discussed. (Jernigan-Vanderbilt)
W75-06307

SOLVENT EXTRACTION AND SPECTROPHOTOMETRIC DETERMINATION OF NICKEL (II) WITH THIOTHENOYLTRIFLUOROACETONE,
Indian Inst. of Tech., Bombay. Dept. of Chemistry.
R. R. Mulye, and S. M. Khopkar.
Separation Science, Vol 7, No 5, p 605-610, 1972. 2 fig, 2 tab, 7 ref.

Descriptors: *Nickel, *Solvent extraction, *Analytical techniques, *Colorimetry, Separation techniques, Spectroscopy, Testing procedures, Laboratory tests, Instrumentation, *Pollutant identification.

Nickel was quantitatively extracted with 0.001M thiothenoyltrifluoroacetone (STTA) in carbon tetrachloride at pH 6.5. An aliquot of the solution containing 20 micrograms of nickel was taken. The volume of the aqueous phase was made up to 25 ml. The solution was then transferred to a spearatory funnel and 10 ml of 0.001 M STTA in carbon tetrachloride was added. The mixture was shaken on a wrist action flask shaker for about 10 minutes, and the layers were allowed to settle and separate. The aqueous layer was withdrawn and the yellow-orange colored nickel complex was transferred into a volumetric flask and its absorbance was measured at 480 nm against the reagent blank. The amount of nickel was computed from the calibration curve. The system conforms to Beer's Law in the concentration range of 0.5 - 5 micrograms/ml of nickel. The complex is stable for 96 hours. Nickel can be separated from several cations and anions. (Jernigan-Vanderbilt)
W75-06308

THE SEPARATION OF ZINC AND COPPER FROM SEAWATER BY ADSORPTION COLLOID FLOTATION,
Hawaii Univ., Honolulu. Dept. of Chemistry.
Y. S. Kim, and H. Zeitlin.
Separation Science, Vol 7, No 1, p 1-12, 1972. 4 fig, 5 tab, 15 ref.

Descriptors: *Zinc, *Copper, *Cations, *Sepatation techniques, *Sea water, Adsorption, Inorganic compounds, Ions, Instrumentation, Spectroscopy, Analytical techniques, Colloids, Flotation, *Pollutant identification.

Procedures were described whereby zinc and copper present as cations in seawater were brought to the surface in less than 5 min by an adsorption colloid flotation process which utilizes a negatively charged ferric hydroxide collector, a cationic surfactant, dodecylamine and air. Statistical studies on test series showed a mean recovery of 94.0% with a relative standard deviation of 6.1% for zinc and a mean recovery of 95.0% with a relative standard deviation of 6.1% for copper. (Jenigan-Vanderbilt)
W75-06309

ION EXCHANGE BEHAVIOR OF MERCURY (II) IN MIXED SOLVENTS: SEPARATION FROM ZINC (II), CADMIUM (II), GOLD (III), AND THALLIUM (III),
Roorkee Univ. (India). Chemical Lab.
C. B. Gupta, and S. N. Tandon.
Separation Science, Vol 7, No 5, p 513-525, 1972. 17 tab, 4 fig, 16 ref.

Descriptors: *Ion exchange, *Mercury, *Separation techniques, *Solvents, Zinc, Cadmium, Gold, Thallium radioisotopes, Cation exchange, Anion exchange, Acids, Laboratory tests, *Pollutant identification.

The cation-and anion-exchange behavior of Zn (II), Cd (II), Au (III), Tl (I), and Tl (III) in a mixture of HCl or HNO3 and methanol, acetone, or tetrahydrofuran at constant 0.6M acid strength was investigated. The coefficients of those elements between cation- and anion-exchangers Amberlit IR-120 and Amberlite IR-400, and aqueous solutions containing nitric or hydrochloric acid

and organic solvents were determined. The separation of Hg (II) from Zn (II), Cd (II), Au (III), and Tl (III) was proposed in mixed solvents with high separation factors. Some of these separations were actually performed using the column methods. (Jernigan-Vanderbilt)
W75-06310

ASSOCIATION OF METHIONINE REQUIREMENT WITH METHYL MERCURY RESISTANT MUTANTS OF YEAST,
Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
A. Singh, and F. Sherman.
Nature, Vol 247, No 5438, p 227-229, January, 1974. 2 fig, 8 ref.

Descriptors: *Mercury, *Microorganisms, *Metabolism, Organic compounds, Laboratory tests, Testing procedures, Cultures, Yeasts, Isolation, Pollutant identification.
Identifiers: *Methylmercury, *Methionine.

A method of isolation and characterization of methyl mercury resistant mutants of Saccharomyces cerevisiae is described. The study was undertaken with the view that the examination of physiological changes associated with genetically defined resistant mutants will be useful in studying the mechanisms of cellular detoxification of organic mercurials. When the colonies selected for methyl mercury resistance were analyzed, most of them would not grow on minimal medium with or without methyl mercury and with the supplements necessary to satisfy the nutritional requirement of the parent strain. Further tests revealed that these mutants had become auxotrophic for methionine; the authors hypothesized that a compound involved directly or indirectly in the biosynthesis of methionine can cause detoxification either by the formation of a complex with methyl mercury or by conversion of it to a volatile product. (Jernigan-Vanderbilt)
W75-06311

TRACE METALS IN OYSTER SHELLS,
Louisiana State Univ., Baton Rouge. Dept. of Geology.
R. E. Ferrell, T. E. Carville, and J. D. Martinez.
Environmental Letters, Vol 4, No 4, p 311-316, 1973. 1 tab, 5 ref.

Descriptors: *Trace elements, *Oysters, *Metals, *Distribution, Marine animals, On-site data collections, Analytical techniques, Spectroscopy, Laboratory tests, Lead, Mercury, Cadmium, Zinc, Copper, Chromium, *Pollutant identification.
Identifiers: Atomic absorption spectrometry.

Measurements using atomic absorption spectrometry established the presence of Pb, Hg, Zn, Cu, and Cr in shells of the oyster Crassostrea virginica in amounts considerably higher than their concentration in sea water. The degree of concentration was more than a thousand-fold for all elements. Lead exhibited the greatest concentration, mercury the least. Preliminary comparisons of trace elements in shells from widely separated areas did not suggest large differences. It is concluded that the relatively high values obtained for Pb, Cu, and Cd suggest these analyses have a good potential for assessment of man's contribution to global pollution. Comparison of these data with trace element contents of ancient shells may be useful in evaluating the importance of pollution-induced changes in coastal waters. (Jernigan-Vanderbilt)
W75-06312

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
For primary bibliographic entry see Field 5B.
W75-06315

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
For primary bibliographic entry see Field 7B.
W75-06316

AGRICULTURAL USE OF SEWAGE TREATMENT PLANT SLUDGES: A POTENTIAL SOURCE OF MERCURY CONTAMINATION,
Toronto Univ. (Ontario). Dept. of Geology.
For primary bibliographic entry see Field 5B.
W75-06323

TRACE ELEMENT EQUILIBRIUM STUDIES,
Naval Oceanographic Office, Washington, D.C.
J. D. Gassaway.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-776 124, $3.25 in paper copy, $2.25 in microfiche. December, 1973, 11 p, 4 fig, 1 tab, 8 ref.

Descriptors: *Trace elements, *Equilibrium, *Seawater, *Ion exchange, *Resins, Water analysis, Diffusion, Laboratory tests, Metals, Ion transport, Water quality control, Ions, *Pollutant identification, Chemical reactions.

The equilibrium distribution coefficients of trace elements in seawater on ion-exchange resins were investigated. These resins contained various organic complexing and precipitating agents known to react with the elements under study. The resins used were either commercially prepared or synthetic modifications of commercial resins. The equilibrium distribution coefficient (log D) of 65Zn with respect to Chelex 100 and toluenesulfonamide increased with increasing pH, obtaining a maximum value (log D greater than 4) at a pH of 8.3. For the same resins, log D of 60 Co(II) decreased with increasing pH for Chelex 100, but increased with increasing pH for toluenesulfonamide. Log D for 60 Co(II) with respect to Chelex 100 was always higher than the values observed for toluenesulfonamide as a function of increasing pH. Log D's were determined for 51 Cr (III) with respect to Chelex 100, toluenesulfonamide, ammonium pyrrolidinedithiocarbamate (APDC) and 2- amino cyclohexenedithiocarboxylic acid (ACDC). Toluenesulfonamide had the maximum log D (about 3) for 51 Cr(III) at pH 8.5. The equilibrium distribution coefficients for 203 Hg(II) were determined only with respect to Chelex 100. Log D varied from approximately two at pH 2 to one pH 8. Since Chelex 100 acts as an anion' exchange resin below pH 4, apparently Hg C14(2-) is being exchanged. (Pulliam-Vanderbilt)
W75-06326

PERSISTENCE OF SOME CHEMICALS IN PACIFIC NORTHWEST FORESTS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-06335

QUANTITY AND QUALITY OF STREAMFLOW AFTER UREA FERTILIZATION ON A FORESTED WATERSHED: FIRST-YEAR RESULTS,
No Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
G. M. Aubertin, D. W. Smith, and J. H. Patric.
In: Forest Fertilization Symposium Proc., p 88-100, 1973. 4 fig, 5 tab, (Forest Service General Technical Report NE-3).

Descriptors: *Forest management, *Fertilization, *Water quality, Water chemistry, *Streamflow, Forest watersheds, *Ureas, Water analysis, Pollutant identification.

Streamflow was analyzed to determine the effects on the quantity and quality of water flowing from a 74-acre calibrated watershed that had been fertilized with 500 pounds of urea per acre. During the first year after fertilization, no change was detected in the quantity of streamflow. Water quality, as determined from analysis of 829 samples, remained high. Comparison of nitrogen discharge data for the year before and after fertilization revealed approximately 18 percent greater nitrogen discharge after fertilization. Loss of nitrogen was accompanied by increased loss of certain metallic cations. (Forest Service)
W75-06338

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
D. J. Reasoner.
Journal Water Pollution Control Federation, Vol 46, No 6, p 1395-1408, June, 1974. 19 ref.

Descriptors: *Microbiology, *Salmonella, *Water pollution, *Disease, *Reviews, *Bibliographies, Pollutant identification, E. coli.
Identifiers: *Gastrointestinal disturbances, Enteropathogenic e coli.

Enteropathogenic Escherichia coli, is a most serious in young animals and children. Chlorination of water prevented contamination of water that had led to the poisoning of laboratory animals. Ewin developed the three species concept to avoid confusion in the study of Salmonella. All Salmonella, excepting the S. cholera-suis and S. typhi, are considered serotypes or biserotypes of S. enteritidis, numbering 1,500 or more. According to the U.S. Department of Agriculture, the frequency of salmonellae isolations from different nonhuman source categories were: animal feeds (32.6 percent), domestic animals and their environment (26.7 percent), human food products; eggs, poultry, red meat, etc. (14.5 percent), fish, reptiles and environment (10.1 percent), and wild animals and birds (4.4 percent). It was determined that the salmonellae in feed were not the salmonellae which produced salmonellosis in animals. (Leibowitz-FIRL)
W75-06342

5B. Sources Of Pollution

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK. EXECUTIVE SUMMARY.
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W75-05858

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK, FINAL REPORT (REVISED).
Little (Arthur D.), Inc., Cambridge, Mass.
For primary bibliographic entry see Field 6B.
W75-05870

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
C. D. Haynes.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 660, $3.75 in paper copy, $2.25 in microfiche. Alabama Natural Resources Center, University, Alabama, September 1974. 42 p, 11 fig, 1 tab, 13 ref, append. OWRT A-037-ALA(1).

Descriptors: *Waste disposal wells, *Permeability, *Industrial wastes, *Underground reservoirs, Underground waste disposal, *Pressure fracturing, Costs, *Computer programs, Design.

Identifiers: Disposal costs, *Hydraulic fracture gradient.

The effect of the hydraulic fracture gradient on deep-well liquid waste disposal has been studied by computer. A program used for calculating design and cost information for subsurface disposal was modified to calculate hydraulic pressure gradient and pressure buildup. Pressure buildup calculations were made for three conditions of decreasing permeability throughout the life of a disposal well. By stipulating the hydraulic fracture pressure to be a never-exceed value, the computer was instructed to drill additional wells if the injection pressure increased to this limiting value. These studies show that unit costs for deep-well disposal increase as the permeability diminishes, as would be expected, but several inflection points in this analysis indicated that optimum design criteria exist. Unit costs also increase with increasing values of original reservoir pressure, but decrease as injection volume is increased. The unit costs converge, however, as the permeability is impaired. This program should offer a quick design and cost estimate for practically any deep-well disposal project. The addition of pressure buildup and hydraulic fracture gradient in the computations should present a more realistic approach to deep-well disposal system design than has been previously available.
W75-05911

MAN-CAUSED FLUCTUATIONS IN QUALITY OF WATER FROM FORESTED WATERSHEDS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant.
In: Proceedings of the Joint FAO/U.S.S.R. International Symposium on Forest Influences and Watershed Management, Moscow, U.S.S.R. 17 August - 6 September 1970, Food and Agricultural Organization, United Nations (Rome), p 209-218, 1972. PNW-1602.

Descriptors: *Water pollution sources, *Chemicals, *Pesticides, *Sedimentation, *Nutrients, Temperature, Land management, *Forest watersheds, Path of pollutants, Water quality.

Water quality is a relative term, the meaning of which varies with intended use of the water. In the absence of well-defined standards of quality for waters flowing from forested watersheds, water quality can only be related to the broad concept of pollution levels of the various parameters of water quality. For this purpose, water pollution is defined as any impairment of water properties that adversely affects man directly as a living organism or indirectly through reducing the value of his physical objects or possessions or his opportunity for recreation and appreciation of nature. The changes in energy patterns, chemical or physical constitution, or abundance of organisms in forest waters that do constitute pollution are most often the result of man's activity. Results of research indicate that it is possible for man to enjoy the economic and aesthetic values afforded by forested areas and yet maintain an unpolluted supply of water. The key to producing multiple benefits from the forest, including high quality water, is the amount of care that the forest watershed manager can and will exert in all his activities. (See also W75-05912) (Forest Service)
W75-05914

CHEMICAL BRUSH CONTROL: ASSESSING THE HAZARD,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
L. A. Norris.
Journal of Forestry, Vol 69, No 10, p 715-720, October 1971. 1 fig, 4 tab, 23 ref. PNW-1602.

Descriptors: *Water pollution sources, *2-4-5-T, *2-4-D, *Aminotriazole, *Toxicity, Forestry, Persistence, Food chains, Herbicides.
Identifiers: Picloram, *Chemical brush control.

An adequate evaluation of the hazard associated with the use of any chemical agent requires consideration of both the toxicity of the material and the potential for exposure of nontarget organisms. The hazard can be high only if both the toxicity of the chemical and the potential for exposure to a significant dose are high. The relatively large doses of 2,4-D, amitrole, 2,4,5-T, and picloram required to produce acutely toxic responses in most nontarget organisms are not likely to occur from normal chemical brush control operations on forest lands. The short persistence, lack of biomagnification in food chains, and the rapid excretion of these herbicides by animals preclude chronic exposure and, therefore, chronic toxicity. A long history of field use and research shows common brush control chemicals can be used with minimum hazard to the quality of the environment. (Forest Service)
W75-05922

RELATIVE CONTRIBUTION OF SEDIMENT FROM SOURCE AREAS AND TRANSPORT PROCESSES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2J.
W75-05926

COMPARATIVE WATER QUALITY - NATURAL AND DISTURBED STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5A.
W75-05927

THE ENTRY AND FATE OF FOREST CHEMICALS IN STREAMS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
L. A. Norris, and D. G. Moore.
In: Proceedings of a Symposium on Forest Land Uses and Stream Environment, Oct. 19-21, 1970. Oregon State University, Corvallis, p 138-158, August 1971. 4 tab, 9 fig, 82 ref. PNW-1602.

Descriptors: *Water quality, *Water pollution sources, *Herbicides, Insecticides, Fertilizers, Chlorinated hydrocarbon pesticides, Carbamate pesticides, Adsorption, Distribution patterns, Persistence, *Path of pollutants.

Initial distribution of aerially applied forest chemicals, mechanisms of their entry into, and their fate in the aquatic environment are considered. Research findings and long history of use have established that most forest chemicals offer minimum potential for pollution of the aquatic environment when they are used properly. (Forest Service)
W75-05928

THE FUTURE ROLE OF CHEMICALS IN FORESTRY,
Forest Service (USDA), Portland, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4C.
W75-05935

DDT RESIDUES IN FOREST FLOOR AND SOIL AFTER AERIAL SPRAYING, OREGON--1965-68,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant, D. G. Moore, W. B. Bollen, and B. R. Loper.
Pesticides Monitoring Journal, Vol 6, No 1, p 65-72, June 1972. 2 fig, 7 tab, 44 ref. PNW 1602.

Descriptors: *DDT, *DDD, *DDE, Forest soils, Vegetation, Streams, Persistence, Leaching, *Oregon, *Pesticide residues, Water pollution sources, *Path of pollutants.

One month after aerial application of DDT (12 oz/acre) to an eastern Oregon forest, 3 oz/acre of DDT residues (DDT, its isomers and metabolites-DDD,DDE, p,p'-DDT, and o,p'-DDT) were detected in the forest floor; 3 years later, the DDT content had decreased by more than 50%, and had not leached into the surface mineral soil. At the time of spraying, water from two streams draining the sprayed area had a total DDT content of about 0.3 ppb. This low concentration decreased rapidly to levels below limits of analytical detection. No effect of the spraying was noted on soil microbial populations, nitrification rate, or amount of nitrate nitrogen in the soil. Of the 12 oz of DDT applied per acre, about 26% reached the ground surface initially; and over 36 months, about 6% more was brought to the ground in litter-fall. Thus, approximately one-third of the sprayed chemical reached the forest floor. The need for more efficient aerial methods of chemical application is evident. (Forest Service)
W75-05936

STATISTICAL ANALYSIS OF WATER TEMPERATURE RESIDUALS,
Missouri Univ., Rolla. Dept. of Computer Science.
For primary bibliographic entry see Field 2E.
W75-05958

ON THERMAL STRATIFICATION IN LARGE BODIES OF WATER,
Moncton Univ. (New Brunswick). Dept. of Engineering.
For primary bibliographic entry see Field 2H.
W75-05959

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
T. A. Butts.
Available from the National Technical Information Service, Springfield, Va. 22161, as PB-240 992. $3.75 in paper copy, $2.25 in microfiche. Report of Investigation 76, 1974. 32 p, 15 fig, 8 tab, 14 ref, 4 append.

Descriptors: *On-site investigations, *Dissolved oxygen, *Bottom sediments, *Water pollution, *Oxygen demand, Data collections, On-site data collections, Rivers, *Illinois, Sediments, Clays, Sands, Silts, Gravels, Sampling, Instrumentation, Analysis, Organic matter, Water pollution sources, Waste assimilative capacity, Surface waters.
Identifiers: Upper Illinois Waterway.

Oxygen demand characteristics of bottom sediments for a 113-mile reach of the Upper Illinois Waterway were measured in situ at 22 locations in order to assess the effects of such demand on the dissolved oxygen resources of the overlaying water. For these measurements of sediment oxygen demand (SOD), a bottom sampler was specially designed to entrap and seal a quantity of water at the river bottom. Changes in dissolved oxygen (DO) concentrations within the entrapped water were recorded by a DO probe fastened in the sampler. SOD values for 20 undisturbed bottom locations ranged from 0.56 to 5.00 grams per square meter per day (g/sq m/day), and SOD values at 2 disturbed (equatable to barge passages) bottom locations were 6.45 and 8.08 g/sq m/day. Sand and gravel bottoms had an average SOD value of 1.39 g/sq m/day and silt-clay bottoms had an average value of 3.02 g/sq m/day. The oxygen demands of sediments in many parts of the waterway are sufficiently high to impose a significant demand on the DO content of the overlying water. In addition to SOD measurements, 172 bottom samples were collected, described in detail, and

analyzed for percent organic and dried solids content. Expressions for the relationship between these percentages and the SOD rates were developed for silt-clay and sand-gravel sediments, and these expressions were used to estimate probable SOD values at the various sampling sites. Charts of the river bed depict the ranges of SOD values useful in engineering analyses of dissolved oxygen demand relationships for the Upper Illinois Waterway. (Humphreys-ISWS)
W75-05972

A STUDY OF CONVECTIVE-DISPERSION EQUATION BY ISOPARAMETRIC FINITE ELEMENTS,
State Univ. of New York, Buffalo. Faculty of Engineering and Applied Sciences.
M-S. Wang, and R. T-S. Cheng.
Journal of Hydrology, Vol 24, No 1/2, p 45-56, January 1975. 9 fig, 20 ref. OWRT C-4026(No 9006)(3). OWRR 14-31-0001-9006.

Descriptors: *Dispersion, *Aquifers, *Water pollution, *Groundwater movement, *Mathematical studies, Finite element analysis, *Path of pollutants, Boundary processes, Water pollution control, Model studies, Numerical analysis.
Identifiers: Convective-dispersion equation, Isoparametric finite elements, Irregular node distribution.

The transport of pollutants in groundwater aquifers was studied by means of a mathematical model. The governing equation for the movement of impurities took the form of a convective-dispersion equation which was solved numerically by using a isoparametric, quadrilateral finite element method. The mixed boundary conditions and irregular distribution of the nodes were handled easily by the finite element technique. The calculations showed that the numerical model can be used effectively to predict the distribution of contaminant for purposes of groundwater pollution control. (Singh-ISWS)
W75-06015

PROCEEDINGS OF SEMINAR ON METHODOLOGY FOR MONITORING THE MARINE ENVIRONMENT.
Environmental Protection Agency, Washington, D.C., Office of Monitoring Systems.
For primary bibliographic entry see Field 5A.
W75-06020

MATHEMATICAL MODELING AS A FRAMEWORK FOR COASTAL MONITORING,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
R. J. Callaway.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 6-22, October 1974. 4 fig, 1 tab, 22 ref.

Descriptors: *Mathematical models, *Monitoring, *Pollutant identification, Coasts, Model studies, Water pollution sources, Water pollution, Mathematics, Theoretical analysis.

Equations were given for mathematical modeling of coastal pollution of varying time and space scales. Monitoring was discussed in relation to a world model. Depending on the goals of the investigator, pollution problems can be viewed from space scales ranging from microcosmic to world. Time scales span the range from seconds to centuries. A monitoring program should seek to minimize equipment requirements, sampling frequency, and number of sampling locations. This will be determined by the type of waste input and by the physical, chemical, and biological processes affecting the concentration and distribution of the pollution. (See also W75-06020) (Sims-ISWS)
W75-06021

GALVESTON HARBOR: FACTORS AFFECTING POLLUTION AND POLLUTION MONITORING,
Texas A and M Univ., College Station. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06040

A TIME-DEPENDENT, TWO-DIMENSIONAL MATHEMATICAL MODEL FOR SIMULATING THE HYDRAULIC, THERMAL, AND WATER QUALITY CHARACTERISTICS IN SHALLOW WATER BODIES,
Oak Ridge National Lab., Tenn.
M. Siman-Tov.
Available from the National Technical Information Service, Springfield, Va 22161 as ORNL-TM-4626, $25.75 in paper copy, $2.25 in microfiche. ORNL-TM-4626, August 1974. 422 p, 75 fig, 11 tab, 107 ref, 2 append. Contract W-7405-eng-26.

Descriptors: *Mathematical models, *Model studies, *Water quality, *Simulation analysis, Water temperature, Computer models, Synthesis, Analytical techniques, Theoretical analysis, Heated water, Thermal powerplants, Numerical analysis, Equations, Rivers, Estuaries, Shallow water, Open channels, Finite element analysis, Flow characteristics, Velocity, Hydraulics, Temporal distribution, Time, Computer programs, Discharge(Water), Dispersion, Diffusion, Entrainment, Forecasting, Estimating.
Identifiers: *Far-field model, Near-field model.

The model for vertically mixed shallow water bodies was based on a time-dependent discrete element formulation of the basic conservation equations for total mass, momentum, energy, and mass concentration of soluble constituents. Equations were directly formulated in an integral form over each discrete element, reduced to a set of initial-value ordinary differential equations with respect to time, and numerically integrated by the multistep explicit solution of the Runge-Kutta-Gill method. Stability of the time step to be used was evaluated. Effects of bottom shear stresses, wind stresses, heat exchange with the atmosphere, Coriolis forces, seepage, evaporation, rain, tributaries, powerplant intake and discharge, and other possible contributions were included. Internal normal and shear stresses, hydrostatic pressure, turbulent diffusion, and the longitudinal dispersion caused by vertical variations were taken into account. Density and other physical properties can be expressed as functions of temperature and constituent mass concentrations. Although basically a far-field model, it can be used for approximate simulation of the near field. Mutual effects of a number of powerplants sharing the same water body and recirculation of discharge water back into the intake structure can be simulated. Appendixes contain tabulations of input and output for two sample problems and a computer program. (Humphreys-ISWS)
W75-06046

WATER QUALITY DECISION MAKING IN ATLANTA, GEORGIA, THREE RIVERS STUDY,
Black, Crow and Eidsness, Inc., Atlanta, Ga., and Atlanta Public Works Dept., Ga.
For primary bibliographic entry see Field 5D.
W75-06058

OBSERVATION ON THE RATE OF PHOSPHORUS INPUT INTO LAKE GEORGE AND IT'S RELATIONSHIP TO THE LAKE'S TROPHIC STATE,
New York State Department of Environmental Conservation, Albany.
L. J. Hetling.
Technical Paper No 36, August 1974. 20 p, 1 fig, 7 tab, 21 ref.

Descriptors: *Phosphorus, *Eutrophication, *Lake morphology, *Water pollution sources, *On-site data collections, Nutrients, Water quality, Water pollution, Phosphorus compounds, Oligotrophy, Trophic level, Mesotrophy, New York, Water analysis, Water chemistry, Water pollution control.
Identifiers: *Lake George(New York).

There is general agreement that an excessive addition of phosphorus to Lake George will accelerate the cultural eutrophication process, eventually changing the present quality of the lake and reducing its value for recreation and water supply. Due to readily apparent natural differences in north and south portions of the lake, separate phosphorus balances for each portion seemed appropriate. Comments on the limnological implications of the phosphorus input rate are presented. Detailed examination of the watershed indicates that potential phosphorus sources to the lake are: precipitation, land runoff from forested areas, land runoff from urbanized areas, Lake George Sewage Treatment Plant, Bolton Sewage Treatment Plant, and individual septic tank effluents in unsewered areas. Estimated phosphorus loadings for Lake George can be plotted against mean depth as proposed by R. A. Vollenweider (Report No DAS/CSI/68.27, Organization for Economic Cooperation and Development). The results indicate that both the north and south portions of the lake are in the range typical for oligotrophic lakes. The agreement between phosphorus input data and the lake's trophic state indicates that uncontrolled increases in phosphorus loading to the lake will cause a change toward eutrophic conditions. An analysis of data from other geographical areas indicates that developed land may contribute up to five times as much phosphorus per hectare as forested land. If significant development of land surrounding Lake George takes place without definite programs to control phosphorus input, the lake may gradually change from oligotrophic to mesotrophic, and possibly eutrophic. (Poertner)
W75-06064

AN ANALYSIS OF PAST, PRESENT AND FUTURE HUDSON RIVER WASTEWATER LOADINGS,
New York State Dept. of Environmental Conservation, Albany.
L. J. Hetling.
August 1974. 35 p, 3 fig, 8 tab, 8 ref.

Descriptors: *Hudson River, Water pollution control, *Waste water disposal, *River basin development, Municipal wastes, Sewage effluents, Water quality control, New York, Field investigations, Waste water disposal, Rivers, River basins, Analysis, Urbanization.
Identifiers: *Waste water loadings.

In order to make a rational assessment of water quality in the Hudson River, a study and inventory was made of historical, present, and future waste loadings to the Hudson River Basin. The basin was divided into four physiographic areas in order to facilitate data collection. Past and future trends in wastewater loadings were confined to the lower Hudson area due to its significant water volume and the importance of adjacent land use. Because historic data for the metropolitan area was extremely complex, the analysis was limited to municipal wastewater discharges (which are surprisingly low). About 5% of the municipal sewage receives little or no treatment; however, most of the above discharge will be brought to a secondary treatment level within 5 years if the planned construction program is carried out. Due to general population increases, both sewered population and municipal wastewater flow increased dramatically between 1952 and 1965. In 1965, the New York State Pure Waters Program provided significant State funding for construction and operation of

wastewater treatment facilities. Assuming a direct relationship between pollutional wastewater discharge and river quality, significant improvement in water quality should have occurred in the Hudson River since 1964. If presently planned facilities are constructed, such improvements should continue through 1980. (Poertner)
W75-06065

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
R. L. Meyer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 816, $4.25 in paper copy, $2.25 in microfiche. Arkansas Water Resources Research Center, Fayetteville, Publication No. 27, December 1974. 62 p, 12 fig, 1 tab, 18 ref, 2 append. OWRT B-029-ARK(1). 14-31-0001-3860.

Descriptors: Bioindicators, *Distribution patterns, Agricultural runoff, *Phytoplankton, Reservoirs, Man-made Lakes, *Arkansas, Algae, Chlorophyll, Effluents, Eutrophication, Ammonia, Nitrates, Phosphates, Missouri, Silicates, Nitrogen, Phosphorus, Temporal distribution, Spatial distribution, Oxygen, Water temperature, Path of pollutants, Land use, Water pollution effects, Sewage.
Identifiers: *Biochrome analysis, *Beaver Lake(Ark-Mo), White River(Ark-Mo), Orthophosphates.

Selected chemical, physical and biological parameters were determined for a man-made lake, Beaver Lake, on the White River of Arkansas and Missouri. The qualitative and quantitative aspects of the temporal and spatial distribution of the algal subcommunities were determined. The epipelic, epilithic, epizooic and metaphytic subcommunities had little influence on the euplanktonic subcommunity. The relationship between the qualitative and quantitative analysis of the biochromes chlorophyll-a, -b, and -c and the phytoplankton species clustered into biochrome sets is discussed. The temporal and spatial distributional patterns of temperature, oxygen, ammonia-N, ortho phosphate-P and silicates are described in parallel with the biological parameters. These data are related to land use practices on the two major feeder streams. One source is influenced by agricultural runoff and the other by suburbanization plus a sewage outfall from a small city. The effects of the transition from riverine to lentic conditions are also considered.
W75-06073

A SYSTEM FOR GEOLOGIC EVALUATION OF POLLUTION POTENTIAL AT MOUNTAIN DWELLING SITES,
Colorado State Univ., Fort Collins. Dept. of Earth Resources.
J. P. Waltz.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 810, $4.25 in paper copy, $2.25 in microfiche. Colorado Environmental Resources Center, Fort Collins, Completion Research Series No. 59, January 1975. 56 p, 12 fig, 2 tab, 40 ref, append. OWRT B-023-COLO(4).

Descriptors: Water pollution, Evaluation, Mountains, *Waste disposal, *Geologic investigations, *Colorado, *Rocky mountain region, Water wells, Septic tanks, *Path of pollutants.

Development of mountain homesites is accelerating in the Rocky Mountains of central Colorado. These homesites often require individual water wells and sewage disposal systems. Unfortunately, the widely used septic tank-leach field system generally is not suited for use in the mountainous terrain where soils are thin or missing. Although current federal regulations call for six feet or more of soil at the leach field site, many of the individual sewage disposal systems now in operation in the Rocky Mountain Region of Colorado fail to meet this requirement. Sewage effleunt at these sites may directly enter bedrock fractures and travel large distances without being purified. As a consequence, contamination of streams, lakes, and ground water from these malfunctioning leach fields has become a problem of increasing magnitude. Investigations of geologic, topographic conditions at over 100 homesites in the Rocky Mountains of north-central Colorado have resulted in the development of objective criteria for evaluating pollution potential at mountain homesites. In addition, the results indicate that contamination of water wells may be decreased significantly where geologic conditions are considered in the selection of sites for leach fields and wells. Although the results should be considered preliminary, they do tend to confirm that the orientation of jointing surfaces in the bedrock significantly affects the travel path of contaminants.
W75-06075

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
M. A. Brusven, F. J. Watts, R. Leudtke, and T. I. Kelley.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 820, $5.25 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, September 1974. 96 p, 36 fig, 6 tab, 22 ref. OWRT A-032-IDA(2).

Descriptors: *Rehabilitation, Streams, *Aquatic insects, *Sediments, Dredging, Mining, Hydrology, Permeability, Flow model studies, Water pollution, *Idaho, Ecology, Design, Methodology, *Silts, Pervious silts, Sediment load, Sediment transport.
Identifiers: *Emerald Creek(Idaho).

A methodology was developed for rehabilitating a silt-polluted stream and the biological impact of rehabilitation on the insect community was measured. Field work was conducted in the East Fork and main stream of Emerald Creek in northern Idaho. The study involved natural field conditions and laboratory simulation. Six control sites were selected based on similarity of flow, substrate type and channel geometry. Sediment samples were tagged and monitored, hydraulic structures were constructed for modification, and changes in the aquatic insect community were studied in conjunction with physical changes in the streambed. Instream alterations were effective for increasing sediment transport, thus improving insect and fish habitat. Other improved conditions included increased pool-riffle ratios and higher values of percent cobble. Due to its hydrological cycle, Emerald Creek can flush large amounts of fine sediments per year. But until the source of pollution sediments is eliminated, excessive loading will continue.
W75-06077

THE DEVELOPMENT OF TOXICITY INDICES FOR ASSESSING THE QUALITY OF THE ILLINOIS RIVER,
Western Illinois Univ., Macomb. Dept. of Biological Sciences.
For primary bibliographic entry see Field 5C.
W75-06080

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
W. H. C. Maxwell, E. R. Holley, C-Y Lin, and S. Tekeli.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 854, $5.25 in paper copy, $2.25 in microfiche. Research Report No. 98, February 1975. 104 p, 13 fig, 38 ref, 2 append. OWRT B-071-ILL(1). 14-31-0001-3880.

Descriptors: *Overflow, *Underflow, *Stratified flow, Fluid mechanics, *Heated water, Hydraulic engineering, Rivers, *Thermal pollution, *Thermal stratification, *Water temperature, Reynolds number.

A general analysis is presented of two-layered stratified flows taking into account effects of sidewall friction and variation of density with horizontal distance. The analysis is applied to the study of arrested thermal wedges and arrested cold water intrusions. Laboratory data were collected and analyzed and it was determined that bed roughness has a significant effect on the interfacial friction factor for arrested thermal wedges but not for arrested cold water intrusions. Friction factors were found to vary significantly along the wedges indicating that use of average values is perhaps undesirable. Local values of friction factor were found to increase with values of a local interfacial Reynolds number.
W75-06081

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
A. L. Gaufin.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 852, $4.75 in paper copy, $2.25 in microfiche. Montana University Joint Water Resources Research Center, Bozeman, Completion Report, November 1974. 84 p, 6 fig, 25 tab, 40 ref, append. OWRT A-017 MONT(1). 14-01-0001-1846.

Descriptors: *Impaired water quality, *Public health, *Recreation, *Montana, Coliforms, Birds, *Sewage bacteria, Drainage, Water pollution sources, Path of pollutants, Plankton, Productivity.
Identifiers: Flathead Lake(Mont), Glacier National Park(Mont).

A three-phase study, conducted between 1966 and 1970, has as its objective the determination of the water quality of aquatic systems west of the continental divide in Montana. Those parameters which constitute criteria for the quality of water in a particular system were studied to provide criteria as to the quality of water and degree of pollution in various drainage systems throughout the region. Phase 1--investigations of a series of five lakes in the Many Glacier area of Glacier National Park--found that the drainage has not been subjected to extensive organic enrichment. Phase 2--effects of man's activities on the sanitary quality of water in the Grinell Lake-Swiftcurrent Lake Drainage in Glacier National Park--found dangerously high levels of wastes particularly in Swiftcurrent Lake toward the end of the tourist season. Wastes from warm-blooded animals in the park other than man may have contributed to the coliform count. Phase 3--study of plankton productivity throughout Flathead Lake in western Montana--found pockets of coliform pollution near human establishments and campgrounds, and levels of DDT in Kokanee salmon high enough to possibly effect eagles in the area that feed on the spawning salmon. (Williams-Montana State University).
W75-06082

HEAVY METAL DISTRIBUTION IN BOTTOM SEDIMENT AND WATER IN THE TENNESSEE RIVER-LOUDON LAKE RESERVOIR SYSTEM,
Tennessee University, Knoxville, Dept. of Geology.
R. M. Perhac.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 832, $3.75 in paper copy, $2.25 in microfiche. Tennessee Water Resources Research Center, Knoxville, Research Report No. 40, December 1974. 22 p, 1 fig, 9 tab, 12 ref. OWRT A-032-TENN(1).

Descriptors: *Heavy metals, *Bottom sediments, Water quality, *Lake sediments, *Zinc, *Cadmium, *Tennessee, Reservoirs, Water analysis, Mineralogy, Carbonates, Dissolved solids, Clays.
Identifiers: *Tennessee River(Tenn), Loudon Lake(Tenn).

The Tennessee River flows through Knoxville and is dammed about 80 km below the city. Water and bottom sediment were collected over this 80-km course. The sediment was size fractionated and analyzed mineralogically and chemically. Waters were analyzed for particulate content and for Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, and Zn. The mineralogy of the bottom sediment does not reflect the underlying bedrock geology. It reflects the industrialization and effects of damming. Near Knoxville the sediment is mostly coarse dolomite and quartz. The high carbonate content is derived mainly from a zinc milling operation farther upstream. Near the dam the sediment is finer and more clayey, representing a settling effect behind the dam. The trace metal content of the water decreases from Knoxville downstream. The high values upstream, notably Zn and Cd, reflect the high metal content of the carbonates. The metal content in the sediment does not decrease appreciably even though clayey sediment in East Tennessee typically has less heavy metal than the carbonates which comprise the bottom sediment near Knoxville. Apparently heavy metals are being dissolved from the carbonates, transported in solution downstream to be incorporated in the clayey sediment behind the dam. The dammed area is thus serving as a site of accumulation for sediment and for heavy metals. Extraction experiments suggest that the metals are not sorbed on clay surfaces, hence are probably not in forms which are readily available to biota.
W75-06088

SPOKANE RIVER, COOPERATIVE WATER QUALITY STUDY,
Washington State Dept. of Ecology, Olympia. State Water Program.
R. A. Bishop, and R. A. Lee.
Report No 72-001, 1972. 72 p, 16 fig, 30 tab, 10 ref, 2 append.

Descriptors: *Water quality, *Water quality standards, *Water pollution, *Phytoplankton, Coliforms, Oxygen demand, Phosphorus, Nitrogen, Nitrates, *Washington, Dissolved oxygen, Reservoirs, Water pollution sources, Water pollution effects.
Identifiers: *Spokane River(Wash.), Spokane(Wash.), Roosevelt Lake(Wash.), *Long Lake(Wash.).

Eighteen stations were established on the river to monitor water quality and compare it to the Class A standards in the study conducted in 1970 and 1971. Development is minimal and the 32 mile reach is used primarily for recreation. A primary objective was to determine the effects of water quality conditions in Long Lake Reservoir formed in 1915 by construction of Long Lake Dam by the Washington Water Power Company during summer stratification and fall turnover upon water quality of the lower Spokane River. Conditions of increasing eutrophication were noted and phytoplankton was evident in Long Lake and the Lower river. In addition, low dissolved oxygen concentrations were found along with high coliform counts and increased nutrient concentrations in Long Lake, exceeding Class A standards. Although similar conditions were found on the lower river they remained within the standards. The greatest problem is the high nutrient inflow primarily due to domestic sewage requiring additional wastewater treatment along the river. (Park-North Carolina)
W75-06103

REVERSED LONGITUDINAL SALINITY PROFILE OF A MAJOR RIVER IN THE SOUTH-WEST OF WESTERN AUSTRALIA,
Western Australian Dept. of Fisheries and Fauna, Perth. Marine Research Labs.
N. M. Morrissy.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 327-335, December 1974. 4 fig, 1 tab, 12 ref, append.

Descriptors: *Salinity, *River systems, *Australia, Valleys, Geomorphology, Land clearing, Watershed management, Surface waters, Groundwater, Rainfall disposition, River gradients, Conductivity, Seasonal, Fluctuations, Vegetation effects.
Identifiers: Blackwood River(W.A.).

A study is reported of the pattern of salinity in the Blackwood River system of southwest Western Australia, carried out as part of a general investigation of environmental effects on the distribution of a freshwater crayfish. Two series of water samples taken in spring and summer were tested for conductivity values (K2O), and the results show a positive correlation with distance upstream from the estuary. The slopes of the spring and summer regressions were not significantly different, though the load of total dissolved salts passing a gauging station was much greater in spring. The factors contributing to the occurrence of the atypical profile of salinity are discussed. They include a reversed sequence of valley forms, with the younger form nearer to the coast, and the associated tendency to more intense clearing inland; decreasing annual rainfall inland; and the release of cyclic salts from accumulations in groundwater following clearing. Available data from various sources indicate that the pattern of salinity in the Blackwood River is typical of major streams in the area. (Levick-CSIRO Aust)
W75-06112

THE HYDRAULICS OF THE SOUTH AUSTRALIAN GULF SYSTEM. I. CIRCULATION,
Flinders Univ., Bedford Park (Australia).
K. Tronson.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 413-426, December 1974. 10 fig, 4 ref.

Descriptors: *Ocean currents, *Water circulation, *Gulfs, *Australia, Wind pressure, Equations, *Path of pollutants, Coasts, Mathematical models, Hydrodynamics.
Identifiers: Spencer Gulf(S.A.), St. Vincent Gulf(S.A.).

Because of the limited access to the open ocean, discussion of the problems of coastal pollution of waters in the Spencer and St Vincent Gulf system requires an understanding of the circulation within the total area. A study is reported in which it is shown that the steady state circulation equations are a valid first approximation of the circulation in the Gulf area. The equations are solved using two different methods - a hydrodynamical numerical model, and a 'circulation' model - to emphasize different features of the circulation, which seems to be driven mainly by wind stresses. A tentative estimate is made of the time required for water to be replaced in the northern half of Spencer Gulf. (Levick-CSIRO Aust)
W75-06115

THEORETICAL ANALYSIS OF CONDITIONS IN A SALT WEDGE,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 2L.
W75-06117

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

CLINICAL CHARACTERISTICS OF TYPHOID FEVER IN CHILDREN IN EPIDEMIC WATERBORNE INFECTION,
For primary bibliographic entry see Field 5C.
W75-06130

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-06132

MASS AND SALT TRANSFERS AND HALOCLINE DEPTHS IN AN ESTUARY,
Johns Hopkins Univ., Baltimore, Md. Dept. of Mechanics and Materials Science; and Johns Hopkins Univ., Baltimore, Md. Dept. of Earth and Planetary Sciences.
For primary bibliographic entry see Field 2L.
W75-06133

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
S. D. Rees.
Florida Bar Journal, Vol 48, No 5, p 364-367, May 1974. 52 ref.

Descriptors: *Waste disposal wells, *Environmental effects, *Waste water disposal, *Florida, *Water management(Applied), Subsurface waters, Injection wells, Drainage wells, Waste water(Pollution), Well permits, Legal aspects, Legislation, Regulation, Well regulations, Wells, Administrative agencies, state governments, Subsurface investigations, Deep wells, Deep-well pumping, Hydrologic cycle, Ultimate disposal, Underground waste disposal, Waste disposal, Monitoring.
Identifiers: *Administrative regulations.

With increasingly stringent environmental laws and regulations restricting the disposal of sewage and industrial wastes into surface waters, subsurface disposal has received greater recognition as an alternative means of disposal. The history of the use of subsurface disposal in Florida is summarized, and the major areas of concern regarding its feasibility in the state are discussed. The Florida Air and Water Pollution Control Act delegates to the Department of Pollution Control (DPC) the responsibility for enforcing all requirements of state and local pollution control programs. DPC has established strict restrictions upon subsurface waste disposal. Permits are required for both construction and operation of subsurface wells. Efficient waste disposal by means of deep wells depends upon many variables. The lack of knowledge about many of the geologic and hydrologic conditions of the subsurface environment compels the exercise of extreme caution in operating subsurface disposal facilities until means are developed to assess their effect upon the subsurface environment. (Deckert-Florida)
W75-06164

WIND DRIFT SURFACE CURRENTS AND SPREAD OF CONTAMINANTS IN SHELF WATERS,
Lamont-Doherty Geological Observatory, Palisades, N.Y.
A. L. Gordon, and R. D. Gerard.
Available from the National Technical Information Service, Springfield, Va 22161, as AD-786

610, $4.25 in paper copy, $2.25 in microfiche. Report No CG-D-5-75, August 1973. 58 p, 12 fig, 3 tab, 13 ref. DOT-CG-23,339-A.

Descriptors: *Oil spills, *Dye releases, *Oil pollution, *Path of pollutants, *Oceans, Currents(Water), Water circulation, Winds, Tracking techniques, Dye dispersion, Dye concentrations, Pollutants, Waste disposal, Aerial photography, New York.
Identifiers: *New York Bight.

The velocity field in the upper few meters of the water column and its dependence on local environmental factors were investigated. The experiments consisted of aerial photography of a pattern of dyed water, free drifters, dye plumes from anchored generators, drogues set at 1, 3, and 5 meters, and floating computer cards. Also photographed were the acid-iron discolored water patterns farther off the coast which enabled a large-scale study to be made. The basic aim was to better understand the fate and behavior of oil contamination. The results indicated the presence of strong vertical and lateral shear within the upper few meters of the water. The upper few centimeters, the layer which would contain the oil contamination, often move at velocities quite different from average 'surface drift.' The convergent zones detected by the dye also accumulate the oil and move it windward at accelerated rates. The oil and dye were frequently transferred to long discontinuity lines in the velocity field, often running north-south in the New York Bight. Oil spilled on the ocean does not spread laterally in a uniform way, but responds to the basic velocity field of the upper few meters and may, in turn, influence the velocity field directly. (Sims-ISWS)
W75-06187

ESTIMATE OF WATER POLLUTION POTENTIAL BASED ON CHARACTERISTICS OF DOMESTIC SEWAGE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez. Dept. of Civil Engineering.
N-H. Tang.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 885, $3.25 in paper copy, $2.25 in microfiche. University of Puerto Rico, Water Resources Research Institute, Mayaguez, Completion Report, January 1975. 41 p, 8 fig, 15 tab, 11 ref, 2 append. OWRR A-043-PR(1).

Descriptors: *Sewage, *Nutrients, *Puerto Rico, *Biochemical oxygen demand, *Chemical oxygen demand, Solid wastes, Measurement, Estimating, *Domestic wastes, Nitrogen, Phosphorus, Water pollution sources.

Accurate measurements of BOD, COD, solids and nutrients in sewage are very important for water pollution control. Many of these per capita values used by engineers today were established decades ago. Re-evaluation of these values is necessary. The sewage from a typical residential area with a population of 1,203 was sampled and measured. Sixteen 24-hour composite samples were collected and analyzed. The average per capita sewage flow was 57.4 gal/day and the average BOD loading was 0.088 lb/day/capita. Both are lower than the established values. Higher concentration of suspended solids (0.126 lb/day/capita) may have been caused by the fact that all houses in the survey area have garbage grinders. Both nitrogen and phosphorus nutrients per capita loading values in the sewage were higher than results of recent Milwaukee study. The need for more washing and cleaning in the tropical climate and the large consumption of high protein foodstuff such as beans in Puerto Rico may be the causes of the difference.
W75-06202

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
For primary bibliographic entry see Field 2L.
W75-06209

THE INFLUENCE OF ARTIFICIAL RAINFALL AND DI-1-P-MENTHENE ON KARBUTILATE MOVEMENT IN GREENHOUSE SOIL,
Edgewood Arsenal, Aberdeen Proving Ground, Md.
R. M. See, and W. Hurtt.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 607, $3.25 in paper copy, $2.25 in microfiche. Edgewood Arsenal Technical Report EC-SP-74014, September 1974. 9 p, 3 fig, 2 tab, 12 ref.

Descriptors: *Herbicides, *Evaporation control, *Runoff, Bioassay, Greenhouses, Soils, Erosion, Pollutants, Water pollution, Oats, Beans, Simulated rainfall, *Path of pollutants, Water pollution sources.

Simulated rainfall was applied to flats of oats growing in greenhouse soil which had previously been treated with combinations of karbutilate and di-l-p-menthene (Vapor Gard). Aliquots of the runoff from each treatment were applied to the roots of bean plants grown in solution culture as a bioassay for the presence of the herbicide. The growth of the bean plants treated with runoff water from the karbutilate plus Vapor Gard treatment was significantly less than the growth of the plants receiving runoff aliquots from the karbutilate treatment. The dry weight of oats clipped from flats treated with karbutilate was significantly less than the values obtained for the karbutilate plus Vapor Gard treatment. These data suggest that Vapor Gard increased rather than decreased the amount of karbutilate in the surface runoff. (Sims-ISWS)
W75-06214

SURVIVAL OF VIRUSES AND BACTERIA IN A SIMULATED SANITARY LANDFILL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
R. S. Engelbrecht.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 589, $4.25 in paper copy, $2.25 in microfiche. Report No. Tissue-API-73-1, December 1973. 51 p, 8 fig, 8 tab, 11 ref.

Descriptors: *Landfills, *Bacteria, *Viruses, *Lysimeters, Simulation analysis, Waste disposal, Solid wastes, Pathogenic bacteria, Leachate, Water pollution sources, Path of pollutants.
Identifiers: Disposable diapers.

The problem of pathogens in sanitary landfills was studied. A large-scale lysimeter was operated to simulate a sanitary landfill. Lysimeter was filled with residential solid waste and seeded with specific amounts of viruses. Leachate generated by landfill was analyzed for viruses and bacteria. Under the conditions of lysimeter operation and considering the virus detection method used, no viruses were found in the leachate. The bacterial content of the leachate, as measured by total plate count, total coliforms, fecal coliforms, and fecal streptococci, was found to decrease with time of lysimeter operation. (Sims-ISWS)
W75-06231

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
J. F. McNabb, and W. J. Dunlap.
Ground Water, Vol 13, No 1, p 33-44, January-February 1975. 62 ref.

Descriptors: *Groundwater, *Water quality, *Water pollution sources, Biological communities, Ecosystems, Habitats, Heat resistance, Sulfur bacteria, Methane bacteria, Soil microorganisms.

Biological activity occurring in subsurface regions below the soil zone may be of considerable importance in determining the fate and effect of pollutants in groundwater, but this possibility has received little previous attention. A discussion was given of subsurface biological activity in regard to groundwater pollution as reflected by available literature references. The subsurface environment was discussed in terms of factors likely to be of greatest significance in regard to the development of biological systems, and previous investigations of subsurface microbial activity were reviewed. Available information indicates the presence in the upper continental crust of the earth of numerous regions, particularly those of sedimentary origin, which are probably suitable habitats for many microbial species. Previous investigations of subsurface microbial activity clearly show the presence of diverse microbial populations in many subsurface regions below the soil zone. Hence, microbial activity appears both possible and probable in most subsurface regions of importance in regard to groundwater. Further elucidation of the extent and nature of microbial activity in subsurface regions is needed in developing methods for predicting the impact on groundwater quality of pollutants released into the earth's crust. (Gibb-ISWS)
W75-06238

A STUDY OF SOIL MATRIC POTENTIAL AND TEMPERATURE IN HANFORD SOILS,
Battelle Pacific Northwest Labs., Richland, Wash. Water and Land Resource Dept.
For primary bibliographic entry see Field 2G.
W75-06240

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
W. B. Gallaher.
Available from the National Technical Informaton Service, Springfield, Va 22161 as AD-783 461, PhD Dissertation, May 1974. 179 p, 38 fig, 10 tab, 48 ref, 6 append.

Descriptors: *Water pollution sources, *Texas, *Rivers, *Flooding, *Ecology, *Flood plains, *Limnology, Physicochemical properties, Biological properties, Surface waters, Ponds, Zooplankton, Benthic fauna, Nitrates, Nitrites, Sulfates, Phosphorus compounds, Organic compounds, On-site investigations, Nutrients.
Identifiers: *Navasota River(Tex).

A limnological investigation was conducted between January 1971 and September 1971 in the Navasota River and an adjacent floodplain in Grimes County, south-central Texas. The study centered upon the physico-chemical and biological dynamics associated with a sudden spring flood. Analyses were made of water samples taken from the river and floodplain, including two small ponds. The early stages of the rise on the river were found to have higher concentrations of organic materials, as well as other chemical constituents, then did stages which followed. This was attributed to the flushing action of those early stages, followed by the dilution of subsequent runoff water. Rainfall runoff was shown to carry rather large quantities of nitrate and phosphate into floodplain ponds. Phosphorus uptake by pond organisms was rapid. Analyses of soil core samples taken before and after flooding along transects across a ponded area on the floodplain and across the high-water line on the floodplain showed no statistically significant variation in the concentrations of constituents measured. (Sims-ISWS)
W75-06242

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5A.
W75-06244

INVESTIGATION OF WATER QUALITY PARAMETERS AT SELECTED POINTS ON THE TENNESSEE RIVER,
Alabama A and M Univ., Normal. Dept. of Chemistry.
For primary bibliographic entry see Field 5A.
W75-06248

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
W. J. Barrett, G. A. Morneau, and J. J. Roden, III.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-232 019, $4.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Cincinnati, Ohio, Report EPA-670/2-74-030, March 1974. 75 p, 7 fig, 24 tab, 36 ref, 1 append. EPA Project R-800602.

Descriptors: *Paints, *Pigments, *Industrial wastes, *Waste treatment, Waste water(Pollution), Waste water treatment, Titanium, Water pollution sources, Chemical wastes, Heavy metals, Water pollution control, Waste water disposal.
Identifiers: Inorganic pigments, Titanium dioxide.

The wastewater management practices in the paint and inorganic pigments industries were studied. Information was obtained from 153 plants manufacturing paints, 10 titanium dioxide plants, and 10 plants that produce other inorganic pigments. The data were analyzed to identify the sources and characteristics of wastewater from the manufacturing processes of these plants, to determine the practices for wastewater control and treatment that are presently employed, and to identify deficiencies in technology that may require research and development to improve control and treatment methods. The major findings of the study indicate that although the paint industry uses approximately 300 million liters (80 million gallons) of water per day, only a small portion of this, less than 5%, is necessarily contaminated by virtue of its use. Suspended solids, consisting of pigments and resin particles, are the major wastewater contaminants of the paint industry. The wastewaters from plants that produce titanium dioxide or other inorganic pigments generally contain a high level of dissolved solids and acids for which no entirely satisfactory control and treatment methods exist. (Sims-ISWS)
W75-06249

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
F. L. Doyle.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-31811, $3.25 in paper copy, $2.25 in microfiche. November 21, 1973. 9 p, 2 fig. NASA Contract NAS8-30216.

Descriptors: *Remote sensing, *Hydrogeology, *Fractures(Geologic), Groundwater resources, Aquifers, Groundwater, Groundwater recharge, *Path of pollutants, Water pollution sources, Satellites(Artificial), Data collections, *Alabama.
Identifiers: *ERTS-1 imagery.

Knowledge of the locations at which contaminants could enter the aquifer is an important consideration in water quality management. Remotely sensed data may help in defining possible points of entry of potential contaminants into the limestone aquifer in Madison County. The target area of investigation was the western two-thirds of Madison County, Alabama, along with parts of adjoining counties. Visual examination of the imagery (both prints and transparencies) for natural lineations was the primary method of study. The color densitometer converted shades of gray into combinations of 32 colors plus black. By selecting the most advantageous color combinations, this density slicing enhanced the imagery and allowed lineations to be recognized more readily. Imagery from satellites and high-altitude airborne platforms are effective materials for interpretation of natural lineations. If these lineations are assumed to be caused by fractures in the bedrock, then the location of fractures is possible from these materials. Location of fractures is helpful in establishing potential points of entry of contaminants. (Sims-ISWS)
W75-06251

DEVELOPMENT OF FRESH GROUND WATER NEAR SALT WATER IN WEST VIRGINIA,
Environmental Protection Agency, Wheeling, W. Va.
For primary bibliographic entry see Field 4B.
W75-06258

BACTERIOLOGICAL CRITERIA FOR GROUND-WATER QUALITY,
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06259

LIMNOLOGY OF DUFFIN CREEK AND THE LOCATION OF CENTURY CITY,
Waterloo Univ. (Ontario). School of Urban and Regional Planning.
For primary bibliographic entry see Field 5A.
W75-06264

THE FATE OF SPILLED OIL IN THE SOIL,
Institute TND for Environmental Hygiene, Delft (Netherlands).
J. A. Somers.
Hydrological Sciences Bulletin, Vol 19, No 4, p 501-521, December 1974. 13 fig, 15 ref.

Descriptors: *Oil spills, *Soil contamination, *Groundwater, *Path of pollutants, Mathematical models, Pollutants, Oily water, Soil physical properties, Soil water movement, Groundwater movement, Subsurface flow, Soils, Subsoil, Topsoil, Oil pollution, Biodegradation, Darcys law, Capillary conductivity.

The behavior of spilled oil within the soil and subsoil was described in terms of the known models for its movement and biochemical transformation. In the case of multiple phase flow, the exactness of the existing models must be doubted; besides, when an oil spill occurs, little will be known about the magnitudes of the physical parameters of the model. One can obtain a rough estimate of the expected extent of contamination, which, in practice, often suffices to decide on the line of action. When a single phase flow (hydrocarbons dissolved in groundwater) is concerned, Darcy's law can be used to arrive at quantitative conclusions. However, little is known about the solubility of hydrocarbons in practical situations. With respect to biological transformations, the model of hydrogen transfer is useful. However, a peroxidation for which molecular oxygen is necessary takes place during the first stage of oxidation; an aerobic environment is essential. In the underground, free oxygen will therefore act as a limiting factor. The transformation velocities are highly dependent on the structure of the compound; account should be taken of the solubility of the transformation products which exceeds the solubility of the original hydrocarbons. (Sims-ISWS)
W75-06266

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
For primary bibliographic entry see Field 5C.
W75-06298

A PROPOSED STRUCTURE OF AN ALUMINUM-PHOSPHATE SPECIES OF IMPORTANCE IN WASTEWATER TREATMENT,
Towill (R. M.) Corp., Honolulu, Hawaii.
For primary bibliographic entry see Field 5D.
W75-06300

LEAD ORTHOPHOSPHATES - IV, FORMATION AND STABILITY IN THE ENVIRONMENT,
Canada Centre for Inland Waters, Burlington (Ontario).
J. O. Nriagu.
Geochimica et Cosmochimica Acta, Vol 38, No 6, p 887-898, June, 1974, 5 fig, 1 tab, 36 ref.

Descriptors: *Lead, *Phosphates, *Environment, *Solubility, Chemical reactions, Oxidation, Inorganic compounds, Ions, Waste water(Pollution), Soils, Phase diagrams, Distribution, Chemical precipitation, *Path of pollutants.

Experimental and predicted thermochemical constants were used to assess the formation and stability of lead phosphates in soil and sedimentary environments. For the chemical conditions likely to be encountered in oxidizing environments, the stability fields of pyromophites and plumbogummite predominated strongly over those of the other secondary lead minerals. The theoretical phase relationships together with several field observations were used as the basis for suggesting that the interaction of lead and phosphorus (to form pyromorphites and plumbogummite in particular) is an important buffer mechanism controlling the migration and fixation of lead in the environment. Calculations using the concentrations of lead and phosphate ions in the serum indicated that the solubility of lead phosphates may be the limiting factor with regard to lead ion concentration in the human body. The removal of lead from wastewater by precipitation as lead chloropyromorphite was considered a spin-off of possible industrial interest. (Jernigan-Vanderbilt)
W75-06303

BIOLOGICAL CYCLES FOR TOXIC ELEMENTS IN THE ENVIRONMENT,
Illinois Univ., Urbana. School of Chemical Sciences.
J. M. Wood.
Science, Vol 183, No 4129, p 1049-1052, March, 1974. PHS(AM 12599)NSF(GB26593X).

Descriptors: *Cycles, *Toxicity, *Trace elements, *Microorganisms, *Biochemistry, Environment, Oxidation, Inorganic compounds, Cadmium, Cobalt, Mercury, Arsenic compounds, *Path of pollutants, Water pollution effects.

Some of the chemical and biochemical transformations of toxic elements in the environment were described with special emphasis on the role played by microorganisms. By means of oxidative and reductive reactions catalyzed by enzymes, microorganisms can convert inorganic compounds into mixtures of compounds. With mercury as an example, cycles for the biological synthesis and degradation of toxic compounds are shown. Methods of predicting which elements could be of environmental concern are discussed. When a metal is introduced into a microbial ecosystem, each formal valence state of that metal is available for chemical or biochemical reactions. With the evolution of a dynamic system of biological cycles for the toxic elements, small disturbances in these cycles will affect the natural equilibriums which will in turn affect the concentrations of toxic intermediates. (Jernigan-Vanderbilt)

W75-06314

ATMOSPHERIC CONCENTRATIONS AND SOURCES OF TRACE METALS AT THE SOUTH POLE,
Maryland Univ., College Park. Dept. of Chemistry.
W. H. Zoller, E. S. Gladney, and R. A. Duce.
Science, Vol 183, No 4121, p 198-200, January, 1974. 2 tab, 14 ref. NSF(GA-20010)(GV33335)+(TX-33777)EPA(AP01214-1)NASA(NSG 398).

Descriptors: *Trace elements, *On-site data collections, *Air pollution, *Water pollution, *Antarctic, Sampling, Analytical techniques, Aluminum, Manganese, Iron, Cobalt, Chromium, Magnesium, Calcium, Zinc, Copper, Lead, Toxicity, Pollutant identification, Path of pollutants.

The results of sampling of the atmosphere at the South Pole for concentrations and sources of trace metals were discussed. This site was chosen because it offers one of the best locations on earth for studying the composition of the background aerosol since it is isolated, both geographically and meteorologically from the major sources of anthropogenic emissions in both the Northern and the Southern Hemisphere. The chemical composition of atmospheric particulate material collected at the geographic South Pole indicated that Al, Sc, Th, Sm, V, Mn, Eu, Fe, La, Ce, Co, Cr, Na, K, Mg, and Ca are derived from either crustal weathering or the ocean. The relatively volatile elements Zn, Cu, Sb, Se, Pb, and Br were apparently derived from other sources. Because of their volatility, vapor-phase condensation or a high temperature dispersion source was suspected for these elements or their compounds. (Jernigan-Vanderbilt)
W75-06315

INTERACTION OF MERCURIALS WITH SALMON SERUM LIPOPROTEINS,
National Oceanic and Atmospheric Administration, Seattle, Wash. Northwest Fisheries Center.
W. L. Reichert, and D. C. Malins.
Nature, Vol 247, No 5442, p 569-570, February, 1974, 2 tab, 1 fig, 19 ref.

Descriptors: *Mercury, *Sockeye salmon, *Distribution, *Absorption, Animal physiology, Toxicity, Proteins, Lipids, Laboratory tests, Analytical techniques, Chromatography, *Path of pollutants.

The transport mechanisms involved in the distribution of mercury and its derivatives throughout the body are discussed. It was demonstrated that inorganic mercury and organic mercury compounds readily bind with the major classes of serum lipoproteins of the sockeye salmon (oncorhynchus nerka). The role played by lipids in those interactions was discussed in reference to data obtained with CHC13:H20 model system. Evidence was presented to show mercuric and methylmercuric ions are sequestered by the lipoproteins of fish serum under physiological conditions. (Jernigan-Vanderbilt)
W75-06321

AGRICULTURAL USE OF SEWAGE TREATMENT PLANT SLUDGES: A POTENTIAL SOURCE OF MERCURY CONTAMINATION,
Toronto Univ. (Ontario). Dept. of Geology.
J. C. Van Loon.
Environmental Letters, Vol 4, No 4, p 259-265, 1973. 2 tab, 14 ref.

Descriptors: *Mercury, *Sewage sludge, *Fertilizers, Agriculture, *Canada, Sewage treatment, Rural areas, Cities, Soils, Public health, Laboratory tests, Samples, Analytical techniques, Instrumentation, *Path of pollutants, Pollutant identification.
Identifiers: Ontario.

The mercury contents of a selection of sewage sludges and fertilizers used for agricultural purposes were determined. Sludges from sewage treatment plants in Southern Ontario were chosen to represent a range of sewage input compositional patterns. These ranged from rural town to heavy density urban types. The results were compared with unsludged soils (rural and urban) in the same local area. The results demonstrated that mercury values in sludges from most localities were many time higher than the levels in soils on which they may be used. (Jernigan-Vanderbilt)
W75-06323

NON-CONSERVATION OF HEAVY METALS IN THE COLUMBIA RIVER ESTUARY,
Oregon State Univ., Corvallis. School of Oceanography.
N. Cutshall, R. Holton, and L. C. Small.
Available from the National Technical Information Service, Springfield, Va 22161. Report No. RLO 2227 T 1241, (1974). 11p, 4 fig, 1 tab, 11 ref.

Descriptors: *Heavy metals, *Estuaries, *Columbia River, *Saline water-freshwater interfaces, Mixing, Zinc, Copper, Manganese, Spectrophotmetry, Suspended solids, *Path of pollutants.

Manganese, copper, and zinc in filtered waters are reported to not be conserved during mixing of Columbia River water with seawater. These metals' concentrations were higher at mid salinities than would be expected from linear mixing of seawater and river water. The Mn concentration at about 7% salinity was roughly six times higher than would be predicted from linear mixing; the Zn concentration was about 1.4 times higher. The authors suggested that the excess metals are derived from riverborne suspended matter. Two alternative hypotheses were also presented. Reprecipitation of the metals seemed to occur at about 20% salinity. (Pulliam-Vanderbilt)
W75-06325

TRACE ELEMENT EQUILIBRIUM STUDIES,
Naval Oceanographic Office, Washington, D.C.
For primary bibliographic entry see Field 5A.
W75-06326

USE OF A NERITIC TROPHODYNAMIC CHAIN WITH MOLLUSKS TO STUDY THE TRANSFERS OF METALLIC POLLUTANTS (UTILIZATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d' Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
M. Aubert, R. Bittel, F. Laumond, M. Romeo, and B. Donnier.
Available from the National Technical Information Service, Springfield, Va 22161 as CONF-7309103-1. In: 6th Symposium International d'Oceanographie Medicale, September 26-30, 1973, Portoroz, Yugoslavia, N.T.I.S. No. Conf. 7309103-1, 26 p, 7 tab, 36 ref.

Descriptors: *Heavy metals, *Food chains, *Neritic, *Mollusks, *Path of pollutants, Industrial wastes, Toxicity, Copper, Zinc, Chromium, Lead, Mercury, Water pollution effects.

Industrial metallic by-products are disposed into the marine environment and can thus lead to phenomena of concentration in oceanic organisms and further on to phenomena of toxicity for the final consumer of the biological chains. This paper presented the results of laboratory experiments concerning the transfer of metallic pollutants within a neritic chain with mollusks. Five metals were considered: copper, zinc, chromium, lead, and mercury, in an ionic form or associated with organic compounds found in effluents and in oceanic environments. The results were discussed to assess the hazards of pollution presented by activation and chemical products. (Pulliam-Vanderbilt)
W75-06327

LEAD: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
S. M. Siegel.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-22959, $4.25 in paper copy, $2.25 in microfiche. Hawaii Botanical Science Paper No. 32, May, 1973. 62 p, 11 fig, 15 tab, 22 ref.

Descriptors: *Lead, *Toxicity, *Environmental effects, *Ecology, *Path of pollutants, *Hawaii, Soil contamination, Industrial wastes, Water pollution sources, Sediments, Fungi, Plant physiology, Absorption, Air pollution effects, Public health, Water pollution effects.
Identifiers: Aspergillus clavatus Desm.

The major conclusion of the study was that lead enters the Hawaiian environment as an industrial contaminant resulting from the combustion of leaded gasoline. The first section of the report discussed lead contamination in urban Hawaii, which found Pb levels of 20-1050 micrograms/g in roadside plants and 30-4300 micrograms/g in soils from various locations in Honolulu. The second section on lead and other metals in the Ala Wai Canal found that the distribution pattern for lead in the sediments of this canal and the Honolulu Yacht Harbor suggested either a complication circulation pattern within the canal or the existence of more than one source of lead. The third section discussed the extent of lead consumption on Oahu, which was attributed to only 2 major industries. There was little widespread loss of Pb from the pineapple canning industry; however, over 400 tons as gasoline additives were consumed annually, of which 80% is released directly to the environment following combustion. The final section described the study of lead uptake by the fungus Aspergillus clavatus Desm, which absorb appreciable amounts of Pb from nutrient broths containing either PbO or Pb(NO3)2. It was suggested that fungi may form important links in a natural lead cycle. (Pulliam-Vanderbilt)
W75-06329

HERBICIDES AND WATER QUALITY IN AMERICAN FORESTRY,
Forest Service (USDA), Parsons, W. Va. Timber and Watershed Lab.
J. H. Patric.
In: Proceedings of the Northeastern Weed Sci. Soc., Vol 25, New York City, Jan. 6-8, 1971. p 365-375. 54 ref.

Descriptors: *Water quality, *Herbicides, Pollution, *Forest vegetation, *Phenolic pesticides, 2,4,5-T, Water pollution, Water pollution control, Water pollution effects, Water pollution sources, Forests, *Reviews, *Pesticide residues.

Scientific literature was reviewed to evaluate effects of forest herbicide use on water quality. No report suggested that proper herbicide use has limited the usefulness of water in forest streams. The long-term effects of herbicide use on water quality are unknown. Some rules are suggested for minimizing water pollution by herbicides applied in forests. (Forest Service)
W75-06333

CHEMICAL CHANGES IN STREAMFLOW FOLLOWING SURFACE MINING IN EASTERN KENTUCKY,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
W. R. Curtis.
In: Proceedings Fourth Symposium on Coal Mine Drainage Research, Mellon Institute, Pittsburgh,

Pennsylvania, April 26-27 1972. p 19-31, (1972) 12 fig, 2 tab, 3 ref.

Descriptors: *Strip mines, *Appalachian mountain region, *Streamflow, *Water quality , Weathering, Water chemistry, Kentucky.

Surface mining exposes rock strata to weathering and erosion, and as a result some chemicals may reach streams and adversely affect water resources. A four-year study of the chemical quality of water in six small watersheds in Kentucky indicated surface mining for coal may result in chemical pollution of streams even in areas where acid is no problem. Greatest increases were in sulfate, calcium, and magnesium. Some elements continue to increase at least two years after mining; others peak quickly after land disturbance and soon return to pre-mining levels. (Forest Service)
W75-06334

PERSISTENCE OF SOME CHEMICALS IN PACIFIC NORTHWEST FORESTS,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
R. F. Tarrant.
In: Proc. 1971 Short Course for Pesticide Applicators, p 133-141. 1 fig, 5 tab, 13 ref. OSU, J. Capizzi and J. Witt, eds. PNW-1602.

Descriptors: *Persistence, Herbicides, *Pesticide residues, *DDT, 2,4-D, 2,4,5-T, Aminotriazole, Chlorinated hydrocarbon pesticides, Forests, Pacific Northwest US, *Path of pollutants.
Identifiers: Phorate, Picloram.

In an eastern Oregon forest, more than half of the DDT originally reaching the forest floor after aerial spraying had disappeared at the end of the first 3 years after spraying. None of the applied DDT was present in the mineral soil at the end of 3 years. Under western Oregon conditions, residues of the highly toxic systemic organophosphate insecticide phorate degraded quite rapidly when application rate was either 1 or 10 pounds per acre. However, at an application rate of 100 pounds per acre, about 98 percent of the chemical was still present in the forest floor and soil after 6 months. At the 100-pound-per-acre rate, a total residue of 4.50 pounds per acre was still present after 18 months. Findings from this study under forest conditions are entirely at variance with those for the same chemical used on agricultural crops in a warmer climate. Of four herbicides studies, 2,4-D degrades most rapidly. Amitrole also degrades rapidly, but 2,4,5-T and picloram are of somewhat longer persistence. Studies of streamwater following first rains after application of these chemicals indicate, however, that 2,4-D, 2,4,5-T, and amitrole residues are not available for transport to streamwater after having weathered over one summer. (Forest Service)
W75-06335

RED BACTERIAL GROWTH (CORYNEBACTERIUM RUBRUM N. SPEC.) IN TAP-WATER SYSTEMS. (IN GERMAN),
For primary bibliographic entry see Field 5C.
W75-06340

THE PROBLEM OF MERCURY CONTAMINATION OF THE BIOLOGICAL ENVIRONMENT AND DOMESTIC ANIMALS,
Army Foreign Science and Technology Center, Charlottesville, Va.
For primary bibliographic entry see Field 5C.
W75-06343

CATTLE FEEDLOT HYDROLOGY,
Oklahoma State Univ., Stillwater. Dept. of Agricultural Engineering.
A. F. Butchbaker.
Presented at Oklahoma Section, American Society of Agricultural Engineers, Oklahoma State University, Stillwater, October 20, 1972, 25 p, 7 fig, 10 tab, 14 ref.

Descriptors: *Feed lots, *Cattle, *Hydrology, *Farm wastes, *Runoff, Precipitation(Atmospheric), Design, Great Plains, Pollutants, Nitrogen, Phosphorus, Chemical oxygen demand.
Identifiers: Runoff control, Cattle density, Total solids.

Many characteristics affect runoff from feedlots, and knowledge of feedlot hydrology is necessary to design runoff control facilities for feedlots. Runoff is variable from feedlot to feedlot, but certain trends are evident in feedlot hydrology. Evidence was gathered from research that was conducted in the southern Great Plains area. Approximately the first one-half inch of rainfall is stored on the feedlot surface with the rest as potential runoff. The annual runoff of most feedlots is forty to fifty percent of the annual rainfall. Also pollutional characteristics and solid transport characteristics of feedlot runoff were determined. Much more research is necessary for the complete picture of runoff, but the present available information should be useful in the design of runoff control facilities and the management of disposal areas. (Russell-East Central)
W75-06345

5C. Effects Of Pollution

CHEMICAL BRUSH CONTROL: ASSESSING THE HAZARD,
Forest Service (USDA), Corvallis, Oreg. Pacific Northwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 5B.
W75-05922

TOXICITY OF 2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN (TCDD) IN AQUATIC ORGANISMS,
Oregon State Univ., Corvallis. Dept. of Fisheries and Wildlife.
R. A. Miller, L. A. Norris, and C. L. Hawkes.
Environmental Health Perspectives, Experimental Issue No. 5, p 177-186, September 1973. 10 fig, 4 tab, 12 ref. PNW-1602.

Descriptors: *Aquatic life, *Toxicity, *Water pollution effects, Organic compounds, *Salmon, Pesticide residues.
Identifiers: TCDD, *Dioxin.

TCDD in water or food is toxic to fish. The effects of exposure for 24-96 hr of young salmon to TCDD in water at levels greater than 23 ng/g is irreversible, and death results in 10-80 days. Duration of exposure is less important than level of exposure except as threshold response levels are approached. The critical exposure period may be somewhat less than 24 hrs in static water toxicity tests in which TCDD concentration may change markedly with time. Small fish are sensitive than large fish on an equivalent exposure level basis. TCDD in food at 2.3 ppm markedly reduced growth of young rainbow trout (10/aquaria) exposed to 6.3 micro g TCDD per tank per week for 4 weeks. TCDD at 0.2 ppb had no effect on pupation of mosquito larvae, but reduced the reproductive success of a pulmonate snail and an Oligochaete worm. Research has established some important toxicity characteristics of TCDD in fish, but considerable work remains to be done. Establishment of minimum threshold response levels during long- and short-term exposure is important. The impact of previous and current TCDD exposure on long-term growth and reproduction of fish needs attention. Information on the movement, persistence, and fate of TCDD in aquatic systems will be required to adequately assess the impact of TCDD in streams. Serious attempts to determine TCDD residues in various parts of the natural aquatic ecosystem are badly needed. The most sensitive analytical techniques will be necessary. (Forest Service)
W75-05929

VARIATION WITH CHAIN LENGTH IN ACUTE TOXICITY OF ALKYLHYDROXAMIC ACIDS TO SALMON (SALMO SALAR) FRY.
Bedford Inst., Dartmouth (Nova Scotia). Marine Ecology Lab.
R. F. Addison, and R. P. Cote.
Lipids. Vol 8 No 9, p 493-497 1973. Illus.

Descriptors: *Salmon, *Fry, Toxicity.
Identifiers: Alkylhydroxamic Acid.

The acute toxicity of saturated n-alkylhydroxamic acids to salmon (S. salar) fry was determined. Within the series n-C6H13CONHOH to n-C10H21CONHOH, acute toxicity (indicated by death) increased with chain length. Shorter and longer chain compounds were not toxic under similar conditions. Factors governing the variation in toxicity with chain length and possible mechanisms of action are discussed.--Copyright 1974, Biological Abstracts, Inc.
W75-05975

RECENT STUDIES ON BIOLOGICAL EFFECTS OF CRUDE OILS AND OIL-DISPERSANT MIXTURES TO RED SEA MACROFAUNA,
National Marine Water Quality Lab., West Kingston, R.I.
E. Eisler, G. W. Kissill, and Y. Cohen.
In: Proceedings of Seminar on Methodology for Monitoring the Marine Environment, Seattle, Washington, October 1973. Environmental Monitoring Series, EPA-600/4-74-004, U.S. Environmental Protection Agency, Washington, D.C., Office of Research and Development, p 156-179, October 1974. 6 fig, 7 tab, 11 ref.

Descriptors: *Bioassay, *Oil pollution, *Water pollution effects, *Oil spills, Oil, Toxicity, Laboratory tests, Sea water, Aquatic animals, Marine biology, Marine animals, Bioindicators, Biology.
Identifiers: *Red Sea, Israel.

Because virtually nothing was known regarding the influence of crude oil or chemical oil counteractants on local coral reef ecosystems, in 1972 the Hebrew University initiated a continuing series of investigations in this subject area. Progress during the first year of laboratory studies was summarized. Specifically acute toxicity to representative species of marine macrofauna of two common grades of crude oils, a chemical oil dispersant used extensively in northern Israel and mixtures of oil and dispersant at realistic application levels, was reported. Bioassays were conducted under static as well as continuous flow conditions. Depth-toxicity interactions were evaluated by using deep (2.0 m) tanks. Sublethal and latent effects of crudes and oil-dispersant mixtures on physiology, metabolism, and behavior were investigated as were short-term degradation and bioaccumulation of oil. (See also W75-06020) (Sims-ISWS)
W75-06028

METHODS FOR MONITORING RADIOACTIVITY IN AQUATIC BIOTA,
Washington Univ., Seattle. Coll. of Fisheries.
For primary bibliographic entry see Field 5A.
W75-06032

MAKING ARTEMIA SLUDGE BIOASSAY MORE ECOLOGICALLY RELEVANT,
Environmental Protection Agency, Edison, N.J. Surveillance and Analysis Div.
For primary bibliographic entry see Field 5A.
W75-06034

COMPARISON OF SPECIES DIVERSITY AND FAUNAL HOMOGENEITY INDICES AS CRITERIA OF CHANGE IN BIOLOGICAL COMMUNITIES,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06036

MICROBIOLOGICAL METHODS FOR MONITORING MARINE WATERS FOR POSSIBLE HEALTH EFFECTS,
Environmental Protection Agency, Narragansett, R.I. Northeastern Water Supply Lab.
For primary bibliographic entry see Field 5A.
W75-06038

IMPACT OF TURBIDITY AND LAKE SEDIMENTATION,
Kansas State Univ., Manhattan.
For primary bibliographic entry see Field 2H.
W75-06053

EFFECTS OF SEDIMENT ON WATER RESOURCE PLANNING,
Corps of Engineers, Omaha, Neb. Missouri River Div.
W. A. Stuft.
Preprint No. 1545, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 10 p, 1 ref.

Descriptors: *Water pollution control, *Erosion control, *Planning, *Reservoir silting, *Sediment control, *Low-flow augmentation, Reservoir construction, Dead storage, Damsites, Reservoir design, River basin development, Sedimentation, Effects, Sediment load, Sediment transport, Channel erosion.

Sediment is a perfect example of the definition which describes a waste as being a resource out of place. Sediment has a double effect. It depletes the land resource from which it is delivered and deteriorates the quality of the water resource in which it is contained. Sediment is the largest single pollutant of water. The sediment burden in streams may come from many different sources through the erosion process. Sediment also helps to transport other pollutants. Planners must take measures to reduce the amount of sediment in streams. One way is to increase low flows brought about through construction of major reservoirs. Low flows in many streams may be less than one-tenth the average annual discharge. Plans must also include a sediment pool or dead storage in any reservoir and proper land conservation to reduce soil erosion. Another large factor in sediment production is streambank erosion. Therefore, various types of channel stabilization works should be utilized. In addition to maintaining the soil resource for food production, the above measures are necessary to preserve the storage capacity in reservoirs; to protect the beauty and utility of recreational areas, particularly those that are water-based; to reduce highway maintenance costs; and to lessen the damage inflicted during urban and industrial expansion. (Poertner)
W75-06056

BIOCHROME ANALYSIS AS A METHOD FOR ASSESSING PHYTOPLANKTON DYNAMICS, PHASE 1,
Arkansas Univ., Fayetteville. Dept. of Botany and Bacteriology.
For primary bibliographic entry see Field 5B.
W75-06073

A MODEL FOR PHYSICAL AND BIOTIC REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Entomology.
For primary bibliographic entry see Field 5B.
W75-06077

THE DEVELOPMENT OF TOXICITY INDICES FOR ASSESSING THE QUALITY OF THE ILLINOIS RIVER,
Western Illinois Univ., Macomb. Dept. of Biological Sciences.
K. S. Lubinski, R. E. Sparks, and L. A. Jahn.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 855, $3.75 in paper copy, $2.25 in microfiche. Illinois Water Resources Center, Urbana, Research Report No. 96, December 1974. 46 p, 11 tab, 9 fig, 25 ref. OWRT A-067-ILL(1). 14-31-0001-4013.

Descriptors: *Toxicity, *Bioindicators, Water pollution effects, Water quality, *Illinois, *Sunfishes, Lethal limit, Toxins, Bioassay, Effluents, Water pollution sources, Ammonia, Linear alkylate sulfonates.
Identifiers: *Illinois River(Ill).

Individual toxicant concentrations in the Illinois River were expressed as fractions of their 96-hr LC50 values to bluegills, yielding their component toxicities in bluegill toxic units (BGTU's). A solution having a toxicity of 1.0 BGTU was defined as being lethal to 50 percent of the bluegills exposed to it for 96 hr. River toxicants included aldrin, undissociated ammonia (ammonia(u)), arsenic, cadmium, hexavalent and trivalent chromium, copper, cyanide, fluoride, linear alkylate sulfonate (LAS), lead, mercury, phenols, and zinc. Component toxicities at different locations on the river were summed to produce the toxicity index, or total toxicity, of the river. Preliminary mean toxicity indices developed from previously published data during 1972 and 1973 ranged from 0.045 to 0.168 BGTU's, on the Illinois and Des Plaines rivers. However, maximum component toxicities of ammonia(u) and cyanide during this period reached 0.063 and 0.467 BGTU's, respectively. LAS, copper, fluoride, and zinc also contributed to the preliminary river toxicity indices. Mean toxicity indices developed during field tests, in which bluegills were exposed directly to river water, and the lack of mortality at these tests, indicated that the Illinois River is not normally acutely toxic to fish. The 96-hr LC50 values of ammonia(u) and LAS to bluegills were found to be 1.65 and 6.5 mg/liter, respectively, using continuous-flow bioassays with dilution water similar in hardness, alkalinity and pH to Illinois River water.
W75-06080

ADAPTATION OF GAME FISH TO HIGHLY ALKALINE DESERT LAKES,
Nevada Univ., Reno. College of Agriculture.
For primary bibliographic entry see Field 2H.
W75-06084

AVAILABILITY OF SEDIMENT PHOSPHORUS TO MICROORGANISMS,
Wisconsin Univ., Madison. Dept. of Soil Science.
A. Sagher, R. F. Harris, and D. E. Armstrong.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 822, $4.25 in paper copy, $2.25 in microfiche. Wisconsin Water Resources Center, Madison, Technical Report, February 1975. 57 p, 22 tab, 15 ref. OWRT A-040-WIS(3). 14-31-0001-3550, 14-31-0001-3850.

Descriptors: *Aquatic microorganisms, *Soil bacteria, *Phosphates, *Lakes, Soils, *Wisconsin, Scenedesmus, Lake sediments, Phosphorus, Nutrients, Algae, Incubation, Biomass, Water pollution effects, Eutrophication, Microbiology.
Identifiers: *Selenastrum, Sediment phosphorus.

The microbial availability of phosphorus (P) in surficial sediments from diverse Wisconsin lakes was evaluated using Selenastrum and Scenedesmus and indigenous sediment populations as test organisms. Phosphorus-deficient algal cells were inoculated into nonsterile sediment-water systems amended with all growth nutrients, except phosphorus so that the sediment was the sole source of phosphorus (0.6 milligrams phosphorus per liter). The inoculated systems were incubated with intermittent shaking under standard light conditions until microbial biomass increases ceased (3 to 4 weeks), with periodic analysis for: (1) algal cell counts and ATP to provide data on microbial growth responses; (2) levels of dissolved ortho-inorganic phosphate (Pi), sodium hydroxide-extractable Pi, and hydrochloric acid-extractable Pi to provide information on the utilization of different sediment Pi forms. Appropriate controls were included to establish phosphorus deficiency in the test system and assess sediment organic phosphorus mineralization. All sediments supplied sufficient phosphorus to increase microbial biomass to about two orders of magnitude. Between 51 and 80% of the sediment Pi was available to the microorganisms. Between 55 and 100% of the non-occluded iron-bound fraction extracted with sodium hydroxide, but essentially none of the hydrochloric acid-extractable calcium-bound Pi fraction was available. Mineralization of sediment organic phosphorus was minimal.
W75-06090

SUDDEN MORTALITY OF A MASSIVE PHYTOPLANKTON BLOOM,
Auburn Univ., Ala. Dept. of Fisheries and Allied Aquacultures.
C. E. Boyd, E. E. Prather, and R. W. Parks.
Weed Science, Vol. 23, Issue 1, p 61-67, January 1975. 4 fig, 5 tab, 19 ref. OWRT A-042-ALA (1).

Descriptors: Algae, *Phytoplankton, *Fish ponds, Nitrogen, Phosphorus, *Cyanophyta, Eutrophication, Anabaena, Channel catfish, Dissolved oxygen, Carbon dioxide, Ammonia, Light penetration, Oxygenation, Decomposing organic matter.
Identifiers: *Anabaena variabilis.

A dense bloom of the blue-green alga, Anabaena variabilis Kuetzing suddenly died in a pond heavily stocked with channel catfish (Ictalurus punctatus L.). Low light intensity caused the formation of gas vacuoles in A. variabilis. The buoyant filaments accumulated at the surface in large numbers during a period of calm, warm weather. Light injury to cells in the surface scum apparently triggered the mass mortality of phytoplankton. Decomposition of dead algae quickly resulted in depletion of dissolved oxygen. Concentrations of CO2 and ammonia increased to high levels and the pH declined following the phytoplankton die-off. A period of 7 days was required for re-establishment of a phytoplankton community and little improvement in water quality occurred until high densities of healthy phytoplankters were present. Massive mortality of fish was prevented by pumping oxygenated water into the pond at two sites and by mechanically agitating surface water in a limited area.
W75-06091

SPOKANE RIVER, COOPERATIVE WATER QUALITY STUDY,
Washington State Dept. of Ecology, Olympia. State Water Program.
For primary bibliographic entry see Field 5B.
W75-06103

STRATIFICATION AND BIOGENIC MEROMIXIS IN TASMANIAN RESERVOIRS,
Tasmania Univ., Hobart (Australia). Dept. of Botany.
P. A. Tyler, and R. T. Buckney.
Australian Journal of Marine and Freshwater Research, Vol 25, No 3, p 299-313, December 1974. 11 fig, 2 tab, 32 ref.

Descriptors: *Meromixis, *Reservoirs, *Stratification, *Australia, Lakes, Lake morphometry, Mixing, Hypolimnion, Seasonal, Hydroelectric plants, Water chemistry, Water quality.
Identifiers: Mersey-Forth Hydroelectric Scheme, Lake Rowallan(Tas), Lake Barrington(Tas).

Lakes Rowallan and Barrington, in the Mersey-Forth hydroelectric scheme, Tasmania, Australia, are formed by dams constructed in narrow, steep-sided gorges. They may be classified as warm monomictic reservoirs, and show familiar seasonal cycles of stratification and holomixis, stratification being more severe in Lake Barrington. Both reservoirs developed anoxic hypolimnia. Lake Barrington was almost filled within six months of the closure of the dam, and equally rapidly developed a monimolimnetic pool, largely attributable to its morphometry and the flooding of dense vegetation. The monimolimnetic pool was restored soon after its destruction by severe flooding, and seems likely to persist in normal inflow conditions. Attendant chemical phenomena of prolonged anoxia pose alleviable problems in the use of the water for domestic, industrial and power generation purposes. (Levick-CSIRO Aust)
W75-06116

CLINICAL CHARACTERISTICS OF TYPHOID FEVER IN CHILDREN IN EPIDEMIC WATER-BORNE INFECTION,
A. G. Gul'Muradov, B. G. Gel'Dyev, S. G. Ba Babadzhanova, and A. V. Vasil'Eva.
Zdravookhr Turkm. Vol 15, No 9, p 43-44, 1971.

Descriptors: *Human diseases, *Infection, Public health, Water pollution effects, Diseases, *Epidemics, Mortality.
Identifiers: Therapy, *Typhoid, Water-borne infection, Antibacterial treatment.

Analysis of case histories of hospitalized children showed that treatment with antibacterial preparations shortens the febrile stage, lessens complications, and prevents death.--Copyright 1974, Biological Abstracts, Inc.
W75-06130

DISSOLVED SILICA IN LAUREL LAKE: INFLUX, UPTAKE, AND DIFFERENTIAL ACCUMULATION DURING SUMMER STRATIFICATION,
Massachusetts Univ., Amherst.
M. Soukup.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-240 876, $4.75 in paper copy, $2.25 in microfiche. Massachusetts Water Resources Research Center, Amherst, Publication No 39, June 1974. 66 p, 6 fig, 13 tab, 52 ref. OWRT-A-052-MASS(2), 14-31-0001-3821.

Descriptors: *Massachusetts, Diatoms, Lake sediments, *Silica, Small watersheds, *Dissolved solids, Absorption, Algae, Stratification, Hypolimniun.
Identifiers: *Laurel Lake(Mass), Dimictic lakes, Anoxic conditions, Myriophyllum, *Dissolved silica, Photic zones, Synedra radians radians.

Laurel Lake is a small (67 ha) dimictic lake in Berkshire County, Mass. In summer, the hypolimnion becomes anoxic and dense Myriophyllum beds dominate shallow areas of the lake. Dissolved silica influx from the watershed (726 ha), diatom uptake, and sediment releases within the lake were determined during summer stratification, April-September 1972. These estimates provide a model of silica flux from photic to aphotic zones. During the diatom maximum more than 97% of the dissolved silica inflow and storage down to 6 m was extracted, mainly by Synedra radians radians. Apparent silica limitation followed but green and blue-green algae did not produce large populations. Photic sediment releases (ca. 0.1 g m-2 day-1), normally 'masked' by uptake, could be seen from mass-balance and diatom frustule budgets. In the aphotic, sediment releases of 0.047 and 0.028 g m-2 day-1 occurred in the clinolimnion and bathylimnion, respectively, roughly equivalent to 17% of the apparent photic uptake. Net profundal sedimentation was estimated to be 102 mg cm-2 yr-1 (dry weight) and 5.2 mg cm-2 yr-1 amorphous silica. Recent sediments show annual couplets, apparently related to the inception of hypolimnetic anoxia accompanying cultural eutrophication.
W75-06190

PRELIMINARY OBSERVATIONS ON THE BIOGEOCHEMICAL CYCLE OF SILICA IN STOCKBRIDGE BOWL (LAKE),
Massachusetts Univ., Amherst.
S. D. Ludlam.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 914, $3.75 in paper copy, $2.25 in microfiche. Massachusetts Water Resources Research CEnter, Amherst, Publication No 38, May 1974. 33 p, 2 fig, 8 tab, 19 ref. OWRT A-052-MASS(1). 14-31-0001-3821.

Descriptors: *Silica, Lakes, Herbicides, Eutrophication, *Massachusetts, Diatoms, Plankton, Dissolved solids, Lake sediments.
Identifiers: *Stockbridge Bowl(Mass), Dissolved silica.

The silica cycle in Stockbridge Bowl was studied for the period 24 March through 9 September 1972. Diatoms dominated the plankton for only a very brief period in late May and eraly June, and silica never became limiting to diatom growth. Although diatoms utilized ca. 56% of the silica actually present or flowing into the photic zone from influent streams during the period of study at least 40 to 50% of the observed conversion of dissolved to amorphous silica took place in the littoral zone, probably by non-planktonic forms. Conversion rates in the littoral were as high as 2 g/sq m/diem at least 6 times the maximum rate for planktonic forms in the limnetic zone. Herbicide treatment caused significant release of dissolved silica in the littoral zone with release rates as high as 1.6 g/sq m/diem. Release rates from hypolimnetic sediments were very small under oxidizing conditions and were moderate under anoxic conditions, ranging from 0.03 to 0.04 g/sq m/diem early in the anoxic period to 0.004 g/sq m/diem in August and early September. Higher rates than this were observed but were probably due to dissolution of diatom frustules sinking through the hypolimnion or recently deposited on the sediment surface. Weathering rates for silica in the watersheds draining into Stockbridge Bowl averaged between 0.012 and 0.014 g/sq m/diem.
W75-06191

SUBSURFACE BIOLOGICAL ACTIVITY IN RELATION TO GROUND-WATER POLLUTION,
Robert S. Kerr Environmental Research Lab., Ada, Okla.
For primary bibliographic entry see Field 5B.
W75-06238

THE EFFECT OF DREDGING IN A POLLUTED ESTUARY ON THE PHYSIOLOGY OF LARVAL ZOOPLANKTON,
South Carolina Univ., Columbia. Belle W. Baruch Coastal Research Inst.
P. J. DeCoursey, and W. B. Vernberg.
Water Research, Vol 9, No 2, p 149-154, February 1975. 5 fig, 17 ref. Contract No. DACW 60-71-C-0009.

Descriptors: *Dredging, *Estuaries, Physiological ecology, Disposal, Zooplankton, Assay, Water sampling, Toxicity, On-site investigations, Larvae, *South Carolina, Water pollution effects.
Identifiers: *Larval zooplankton, *Charleston Harbor(SC), Daphnia, Polydora, Paleomonetes.

The effect of water samples from three dredging locations in Charleston Harbor and its tributaries upon the physiology of larval or juvenile zooplankton was determined. The samples for each dredging location included dredge site, 200 yd downstream, and the weir of the diked disposal area. The effect of the water samples upon survival, metabolism, and behavior of larval or juvenile zooplankton was measured. Since salinities varied at the three locations, the assay organisms included juvenile Daphnia for Location I, newly hatched Paleomonetes for Location II, and larval Polydora for Location III. Weir water proved most toxic; the sample from 200 yd downstream was intermediate in effect. Least toxicity was observed in water from the dredge site. (Roberts-ISWS)
W75-06255

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
W. S. Woolcott.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-241 036(Vol 3 $7.50), PB-241 035(Vol 1 $11.25) both volumes are available in $2.25 in microfiche. Final Technical Report, October 1974, 2 vol 669 p, 31 fig, 203 tab, 259 ref. OWRT C-4016(No 9003)(1), 14-31-0001-9003.

Descriptors: *Thermal pollution, Rivers, Freshwater, Electric powerplants, *Fish populations, *Periphyton, *Macrobenthos, *Food webs, *Seasonal, *Water temperature, Water chemistry, Discharge(Water), Aquatic insects, Algae, Food, Biomass, Water pollution effects, *Virginia, *Ecosystems, Distribution patterns, Rivers.
Identifiers: *Piedmont region(Va), *James River(Va), Artificial substrate, Diversity indices, Hurricane Agnes, Macroinvertebrate taxa, Algae taxa entrainment, Thermal profiles, Electro-fishing.

A two-year study (July 1972-June 1974) of an 8 km stretch of the James River in the Piedmont Province of Virginia was undertaken to determine the ecological relationships of organisms from natural temperature waters and those exposed to the thermal effluents of a fossil-fueled electric power station. Parameters investigated included seasonal changes and distribution of populations of fishes, benthic macroin-vertebrates and algae; entrainment of organisms in the cooling water system of the power station; food-web investigation within and outside of the plume; and physicochemical analyses of heated and ambient temperature water. Oxygen and dissolved nutrient levels indicated moderate organic loading. Substantial diversity of fishes (50 species), macroinvertebrates (196 genera) and algae (44 genera) corroborated these findings. Populations of fishes and macroinvertebrates affected by the heated effluent were smaller and less diverse than were those in ambient temperature water during the warm months (July-October). The fishes showed some recovery in the other months of the year whereas numbers and kinds of macroin-vertebrates in the heated water remained relatively low throughout the year. Diatoms were adversely affected when temperatures in the plume were 29C or higher; blue-green algae populations flourished under these high temperature conditions. Indices of diversity provided supplemental evaluative information on community structure. A compilation of pertinent literature and a list of pollution sources are included.
W75-06298

ASSOCIATION OF METHIONINE REQUIREMENT WITH METHYL MERCURY RESISTANT MUTANTS OF YEAST,
Rochester Univ., N.Y. Dept. of Radiation Biology and Biophysics.
For primary bibliographic entry see Field 5A.
W75-06311

TRACE METALS IN OYSTER SHELLS,
Louisiana State Univ., Baton Rouge. Dept. of Geology.
For primary bibliographic entry see Field 5A.
W75-06312

BIOLOGICAL CYCLES FOR TOXIC ELEMENTS IN THE ENVIRONMENT,
Illinois Univ., Urbana. School of Chemical Sciences.
For primary bibliographic entry see Field 5B.
W75-06314

ADDING FLUORIDES TO THE DIET,
Center for Science in the Public Interest, Washington, D.C.
M. J. Prival, and F. Fisher.
Environment, Vol 16, No 5, p 29-33, June, 1974. 1 tab, 23 ref.

Descriptors: *Fluoridation, *Diets, *Public health, *Toxicity, Fluorides, Human pathology, Human physiology, Foods, Research and development.

In 1950 it was expected that water fluoridation would result in average fluoride intakes among adults of less than 2 mg/day. Recent data indicate that this is probably an underestimate though the magnitude and significance of this have not yet been resolved. The available evidence indicates that a very high fraction (over 80%) of the dietary fluoride consumed by human beings enters the bloodstream. Excess exposure to fluoride leads to fluorosis. Dental fluorosis occurs only in children although teeth affected in childhood remain affected throughout life. Fluorosis can occur at levels quite close to 'optimal' levels of fluoride intake. Serious skeletal fluorosis is associated with fluoride intake levels well above those anticipated from artificially fluoridated water. It is characterized by increased bone density and abnormal bone growths. In advanced forms, skeletal fluorosis can be painful and crippling. It appears from the data presently available that the intake of fluoride from all sources is probably higher than previously estimated. (Jernigan-Vanderbilt)
W75-06318

DECREASED ANTIBODY FORMATION IN MICE EXPOSED TO LEAD,
Oregon State Univ., Corvallis. Dept. of Veterinary Medicine.
L. D. Koller, and S. Kovacic.
Nature, Vol 250, No 5462, p 148-150, July, 1974. 2 fig, 1 tab, 16 ref.

Descriptors: *Lead, *Rodents, *Toxicity, *Cytological studies, Animal pathology, Laboratory animals, Laboratory tests, Testing procedures, Analytical techniques, Spectroscopy.
Identifiers: Antibodies.

The effect of lead exposure on the ability of the body to form antibodies was determined. The purpose of the article was to determine if the decreased circulating antibody in animals that were exposed to lead was a result of a decrease in the number of cells producing antibody. Mice 28 days old were given lead orally (1,375,131,5 or 13.75 ppm). The lead markedly decreased the number of cells forming antibody to SRBC. Mice that received 13.75 ppm lead had intranuclear inclusions up to five days after removal from lead. The cellular degeneration and necrosis in the renal cortex from this group of mice was not as severe at day 6 and could not be recognized by day 11, indicating that there was apparently rapid removal of lead from the kidney after discontinuing administration of lead as well as regeneration of the damaged tubular epithelium. (Jernigan-Vanderbilt)
W75-06319

INTERACTION OF MERCURIALS WITH SALMON SERUM LIPOPROTEINS,
National Oceanic and Atmospheric Administration, Seattle, Wash. Northwest Fisheries Center.
For primary bibliographic entry see Field 5B.
W75-06321

USE OF A NERITIC TROPHODYNAMIC CHAIN WITH MOLLUSKS TO STUDY THE TRANSFERS OF METALLIC POLLUTANTS (UTILIZATION D'UNE CHAINE TROPHODYNAMIQUE DE TYPE NERITIQUE A MOLLUSQUES POUR L'ETUDE DES TRANSFERTS DES POLLUANTS METALLIQUES),
Centre d' Etudes et de Recherches de Biologie et d'Oceanographie Medicale, Nice (France).
For primary bibliographic entry see Field 5B.
W75-06327

LEAD: ASPECTS OF ITS ECOLOGY AND ENVIRONMENTAL TOXICITY,
Hawaii Univ., Honolulu. Dept. of Botany.
For primary bibliographic entry see Field 5B.
W75-06329

RED BACTERIAL GROWTH (CORYNEBACTERIUM RUBRUM N. SPEC.) IN TAP-WATER SYSTEMS. (IN GERMAN),
W. Graef, and L. Bauer.
Zentralbl Bakteriol Parasitenkd Infektionskr Hyg Erste Abt Orig Reihe B Hyg Praev Med. Vol 157 No 4, p 291-303. 1973, Illus. English summary.

Descriptors: *Bacteria, Microorganisms, *Potable water, Lipids, Heat resistance, Resistance.
Identifiers: *Corynebacterium-Rubrum, Flagella, Morphology, Motility, Tap-water, Vacuole, Vermilion corynebacteria, Chlorine resistance.

The occurrence of vermilion corynebacterial growth and its effects in tap-water systems is reported. Of particular morphological importance is lipid storage vacuole formation and motility by means of monotrichous subpolar flagella. These water corynebacteria are thermoresistant at up to 80C. Resistance to chlorine is surprisingly high (up to 0.3 mg/l free chlorine). Proliferation takes place at about 5C--34C. The name C. rubrum sp. nov. is proposed.--Copyright 1974, Biological Abstracts, Inc.
W75-06340

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 5A.
W75-06342

THE PROBLEM OF MERCURY CONTAMINATION OF THE BIOLOGICAL ENVIRONMENT AND DOMESTIC ANIMALS,
Army Foreign Science and Technology Center, Charlottesville, Va.
T. Szprengier.
Available from the National Technical Information Service, Springfield, Va. 22161, as AD-780 998, $3.25 in per copy, $2.25 in microfiche. Translated from Medycyna Weterynaryjna, Vol 27, No 2, p 82-86. (1972). 3 tab.

Descriptors: *Mercury, *Fungicides, *Toxicity, *Public health, *Animal physiology, Environmental effects, *Path of pollutants, Fish physiology, Food webs, Water pollution effects.

The toxicity of mercury and organic and inorganic mercury compounds in human and animal organisms is discussed. Included were: (1) the toxicodynamics of mercury compounds, (2) the mechanism of activity and toxicity of mercury and mercury compounds, (3) the use of mercuric fungicides and the related mercury poisonings and contaminations. The widespread and prolonged use of mercury compounds is becoming a problem because of the creation of Hg residues in plant and animal tissues. As a consequence of using mercuric fungicides there exists the danger of contaminating the entire biological world, not only plants on which the preparatiions are directly used. The accumulation of mercury in the tissues of fish is particularly disturbing, since fish are capable of storing up fairly high quantities of Hg even in water with comparatively low concentrations of the element. (Pulliam-Vanderbilt)
W75-06343

5D. Waste Treatment Processes

OPTIMAL CAPACITY EXPANSION OF A SECONDARY TREATMENT SYSTEM,
General Motors Technical Center, Warren, Mich. Manufacturing Development Staff.
P. N. Mishra, L-T. Fan, and L. E. Erickson.
Journal Water Pollution Control Federation, Vol 46, No 12, p 2704-2718, December 1974. 6 fig, 2 tab, 7 equ, 24 ref.

Descriptors: Water pollution control, *Waste water treatment, *Trickling filters, *Model studies, *Alternative planning, Optimization, Water quality, Standards, Effluents, Costs, Activated sludge, Aeration, Design, Equations, Systems analysis, Structure, Economics.
Identifiers: *Capacity expansion, *Structural parameter method, Treatment plants, Secondary clarifier, Cost minimization.

Examined is the least-cost expansion of an existing secondary trickling filter wastewater treatment system which is unable to meet new effluent quality standards and increased hydraulic and pollutant loading. Using the structural parameter method, a process system synthesis technique, alternative process subsystems are considered for augmentation, including additional trickling filters, secondary clarifiers, and activated sludge aeration vessels, and various combinations of these. Results for each of six alternative expansion schemes, obtained through selective simulation followed by optimization using a modified simplex pattern search technique, are discussed. Then a general structure for the expansion of the secondary wastewater treatment system using the structural parameters for all the possible subsystems is optimized. The minimum cost system, consists of the existing trickling filters followed by an activated sludge aeration vessel and by existing and additional secondary clarifiers. (Bell-Cornell)
W75-05852

PROCESS FOR FLOCCULATION OF SOLIDS FROM AQUEOUS SUSPENSIONS,
Georgia-Pacific Corp., Portland, Oreg. (assignee)
C. H. Ludwig.
U.S. Patent No. 3,850,799, 8 p, 1 tab, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Flocculation, *Waste water treatment, *Lignins, *Pollution abatement, Equipment, Suspended solids, Water pollution control, Water quality control.
Identifiers: Polyoxyalkylene linkages, Polyoxyalkylene dihalide, *Pollution prevention.

A process for the flocculation of solids from aqueous suspensions of finely divided solids comprises treating the suspension with from 1 to 1,000 parts per million of a water-soluble composition of lignin cross-linked with polyoxyalkylene linkages. This flocculates the finely divided solids dispersed in the aqueous suspension, settles the flocculated solids and separates the flocculated solids from the suspension. The composition of lignin is cross-linked with polyoxyalkylene linkages to the extent that the lignin composition has an intrinsic viscosity greater than 0.2 dl/g. The linkages have a molecular weight of from 120 to 1,000 prepared by reacting the lignin as an aqueous solution at a concentration of at least 20 weight percent with a polyoxyalkylene compound selected from the group consisting of polyoxyalkylene di-esters of monosulfonic acids and polyoxyalkylene dihalides under alkaline conditions, the di-esters and diha-

lides having oxyalkylene repeating units of from two to four carbon atoms. (Sinha-OEIS)
W75-05876

SEWAGE AND WATER TREATMENT WITH POLYACID HALIDE MODIFIED COPOLYMERS OF VINYLPYRIDINES AND ACRYLAMIDE OR METHACRYLAMIDE,
Phillips Petroleum Co., Bartlesville, Okla. (assignee)
R. C. Doss.
U.S. Patent No. 3,850,800, 5 p, 2 tab, 1 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Sewage treatment, *Waste water treatment, *Coagulation, *Flocculation, *Water treatment, Filtration.
Identifiers: *Chemical treatment, Vinylpyridine, Acrylamide, Methacrylamide, Polyacid halide, Copolymers.

Sewage and waste water are chemically conditioned with polyacid halide modified copolymers of vinylpyridine with acrylamide or methacrylamide. Coagulation, flocculation, and filtration in sewage and water treatment processes are significantly improved by the use of these modified copolymers. These modified vinylpyridine copolymers increase the settling rate of solids and make easier the removal of such solids in filtration and centrifugation processes. (Sinha-OEIS)
W75-05877

WASTE WATER PURIFICATION SYSTEM,
McQuay-Perfex, Inc., Minneapolis, Minn. (assignee)
P. J. Pearson.
U.S. Patent No. 3,850,801, 7 p, 6 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1699, November 26, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Filtration, *Sewage treatment, *Pollution abatement, Oxidation, Bacteria, Heat exchangers.
Identifiers: *Anaerobic treatment, Settling tanks, Sterilization.

A pump conveys anaerobically treated sewage from the septic tank to a biological oxidation tank which employs a plurality of partially submerged discs providing a surface for the growth of bacterial slimes. A motor rotates the discs so that the bacteria can oxidize the sewage thereby removing substantially all of the biochemical oxygen demand. After dropping to a settling tank, from the bottom of which sludge is returned to the septic tank, the clarified supernatant is passed through a filter to a high efficiency sterilizer which utilizes a heat exchanger. An artificial feed system is provided to supply nutrients to keep bacteria in the biological oxidation tank alive during extended periods of nonuse of the system. (Sinha-OEIS)
W75-05878

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh (England); and Pond (Alan) Equipment Ltd., Harlow (England). (assignees)
A. Armstrong.
U.S. Patent No. 3,850,805, 3 p, 3 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1701, November 26, 1974.

Descriptors: *Patents, *Reclamation, *Filtration, *Water reuse, *Water quality control, *Water conservation, *Pollution abatement, Detergents, Wax, Activated carbon, Sand, Reclaimed water.
Identifiers: *Pollution prevention.

A filter and water reclamation system is disclosed in which a filter bed comprising a filter element of activated carbon and a filter bed comprising a filter element of sand are connected in series. Solids, detergent and wax are removed from water cycled through the system. The water passes from a drain sump to a settling tank in which the major part of the solids in the water is removed by settling. The water overflows from the settling tank into the overflow tank from where it is pumped into the first filter bed and passes through the sand or gravel, any grit being substantially removed in the process. The grit free water is then passed from the bottom of the first filter bed into the top of the second filter bed which contains activated carbon or charcoal. Any detergent and/or wax entrained in the water is adsorbed onto the activated carbon during passage through the second bed. The water leaving the second bed at the outlet is substantially pure. Any excess decontaminated water can overflow into the sewage system without contamination. (Sinha-OEIS)
W75-05880

A WASTEWATER TREATMENT SYSTEM,
W. Hoermann.
U.S. Patent No. 3,850,808, 5 p, 5 fig, 11 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1702, November 26, 1974.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Filtration, *Water treatment, *Pollution abatement, *Water quality control, Equipment, Aerobic treatment, Sewage treatment.
Identifiers: *Pollution prevention, Diffusers.

A multi-chamber storage treatment tank has a receiving chamber for accommodating waste products to be processed; an aeration chamber adjoining the receiving chamber to receive fluids; a first and second settling chamber for separating waste solids from liquids; a discharge chamber receiving liquid from the second settling chamber; and feedback means connected with the receiving chamber and with the second settling chamber for returning the higher density portions of the contents to the receiving chamber for further processing. The tank also includes a diffuser in the aeration chamber to introduce air under pressure into the fluid. An additional feedback means connected with the receiving chamber and with the first settling chamber transfers a portion of the contents to the receiving chamber for further processing. (Sinha-OEIS)
W75-05882

APPARATUS FOR THE TREATMENT AND THE CLARIFICATION OF WASTE WATER,
Institutul de Proiectari Pentru Industria Chimica Anorganica si a Ingrasamintelor, Bucharest, (Rumania). (assignee)
P. B. Teodoroiu.
U.S. Patent No. 3,850,810, 3 p, 2 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1703, November 26, 1974.

Descriptors: *Patents, *Water treatment, *Waste water treatment, *Flocculation, *Pollution abatement, *Water pollution control, Suspended solids, Equipment.
Identifiers: *Pollution prevention, Clarification, Agitation.

An outer basin or tank is centered on a vertical axis and a waste-water inlet is placed at the lowest point of its bottom on the axis. A mixing chamber within the tank is defined by a downward diverging open-bottomed housing centered on the same axis above the inlet. The housing is spaced from the tank bottom by a peripheral clearance to let the mixing chamber connect with the surrounding annular space in the tank. An agitator in the mixing chamber has its body centered on the tank axis and is provided with upper and lower peripheral vanes of opposite pitch placed on a larger-diameter part and on a smaller-diameter part, respectively of a stepped cylinder. As the body is rotated by a suitable drive, the upper vanes exert an upward thrust and the lower vanes exert a downward thrust upon a mixture of waste water and flocculating agent causing it to be intensely circulated and homogenized. The mixture leaves the chamber through the peripheral clearance and forms a slurry in the surrounding space, and a supernatant layer of clear water above the slurry which can be discharged through a collector system. (Sinha-OEIS)
W75-05883

METHOD FOR THE PRIMARY AND SECONDARY TREATMENT OF WASTEWATER IN A UNITARY APPARATUS,
Autotrol Corp., Milwaukee, Wis. (assignee)
W. N. Torpey, and R. A. Sullivan.
U.S. Patent No. 3,849,304, 4 p, 4 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Waste water treatment, *Biological treatment, *Pollution abatement, *Water quality control, *Water pollution control, Equipment, Flotsam, Slimes, Biochemical Oxygen Demand.
Identifiers: *Pollution prevention, *Primary treatment, *Secondary treatment.

The method utilizes a composite apparatus for the treatment of wastewater to remove settleable and flotable solids and to remove and oxidize organic matter and includes a treatment tank having at least two horizontally adjacent bays. Each of the bays has an upper biological treatment zone separated by a horizontally disposed baffle from a lower settling zone. Raw wastewater enters the lower settling zone of one of the bays where settleable and floatable solids are removed, and then turns vertically to flow in a reverse direction through the upper biological treatment zone of the first bay. From the first bay the wastewater is horizontally directed into and through the biological treatment zone of the second bay and is subsequently vertically directed into and through the lower settling zone of the second bay to the weir for collection of the treated fluid. Preferably, two secondary bays, each receiving about one half of the wastewater flow from the first bay, are provided. (Sinha-OEIS)
W75-05890

PROCESS AND APPARATUS FOR REMOVING IMPURITIES FROM CONDENSATE WATER,
Permutit Co., Paramus, N.J. (assignee)
J. R. Anderson.
U.S. Patent No. 3,849,306, 5 p, 1 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Cation exchange, *Resins, *Anion exchange, *Ion exchange, *Filtration, *Demineralization, *Water treatment, Ammonia, Condensation.

The apparatus is designed to provide an improved method for removing undissolved and dissolved impurities from condensate water that contains ammonia while at the same time providing sufficient filtering and ion exchange capacity. Water to be treated is passed through a first bed consisting of a strong acid cation exchange resin in the hydrogen or ammonium form where removal of undissolved solids and substantial, but not necessarily entire, removal of cations takes place. It is then passed through a second bed, comprising strong base anion exchange resin in the hydroxide form where anions are essentially all removed. Finally the water is passed through a third bed consisting essentially of strong acid cation exchange resin in the hydrogen or ammonium form where any cations which may have passed through or leaked from the first bed are removed. (Sinha-OEIS)
W75-05892

METHOD AND APPARATUS FOR TREATING WASTE MATERIAL,
FMC Corp., Chicago, Ill. (assignee)

A. A. Lemke.
U.S. Patent No. 3,847,802, 5 p, 5 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 741, November 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Aeration, *Water pollution control, *Water quality control, *Pollution abatement, Equipment, Sludge.
Identifiers: *Settling tanks, *Pollution prevention.

A novel method and apparatus provide for transferring sludge from a settling tank into an aeration tank and depositing the sludge in the aerating tank at a location that will prevent immediate return to the settling tank. The sludge withdrawal incorporates a simple and inexpensive mechanism for automatically 'wasting' a predetermined amount of sludge during each cycle of operation and the amount can readily be varied by a manual adjustment. The aeration and settling tanks have a common wall with ports adjacent the upper end of the wall to allow aerated waste material to flow from the aeration tank to the settling tank. The sludge from the aerated waste material settles to the tank floor and is returned to the aeration tank through withdrawal that includes a vertical conduit in the aeration tank with the withdrawal means having an open end located below the ports in the common wall. The sludge withdrawal includes a valve element that is freely pivoted on the bottom of the conduit. The valve element is pivoted to a closed position by a fixed member which has an arcuate camming surface at one end that progressively pivots the valve element from the opened to the closed position. (Sinha-OEIS)
W75-05894

METHOD AND APPARATUS FOR UPGRADING WASTEWATER TREATMENT PLANTS,
Autotrol Corp., Milwaukee, Wis. (assignee)
W. N. Torpey.
U.S. Patent No. 3,849,303, 7 p, 8 fig, 1 tab, 9 ref; Official Gazette of the United States Patent Office, Vol 938, No 3, p 1221, November 19, 1974.

Descriptors: *Patents, *Waste water treatment, *Oxidation, *Denitrification, *Biological treatment, *Microorganisms, *Aeration, *Pollution abatement, *Domestic wastes, Equipment, Activated sludge, Organic matter, Treatment facilities.
Identifiers: *Pollution prevention, *Carbonaceous matter, *Nitrogenous matter, Settling tanks, Ammonia nitrogen, Nitrate oxygen.

The method and apparatus are used for increasing the oxidation capacity of carbonaceous and nitrogenous matter in wastewater and provide a denitrification function to existing biological treatment plants, especially activated sludge. A single stage biological treatment unit employing partially submerged rotating biological contactors is used to grow microorganisms that oxidize organic matter, as well as ammonia nitrogen. The effluent from the single stage unit containing sloughed-off solids and nitrate oxygen, is supplied to a denitrification system which can be an existing aeration and final settling tank where such tanks are operated in a manner that denitrifying biological forms develop that utilize the sloughed-off solids from the single stage unit as an energy source and nitrate oxygen for their respiration. (Sinha-OEIS)
W75-05895

REMOVAL OF CYANIDE AND COLOR BODIES FROM COKE PLANT WASTEWATER,
Bethlehem Steel Corp., Pa. (assignee)
S. T. Herman, and R. J. Horst.
U.S. Patent No. 3,847,807, 4 p, 1 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 742, November 12, 1974.

Descriptors: *Patents, *Waste water treatment, *Water quality control, *Pollution abatement, Organic compounds, Iron compounds, Sludge, Flocculation, Equipment, Industrial wastes, Coals.
Identifiers: *Cyanide, *Pollution prevention, Calcium lime, Discoloration, Coke.

Wastewaters, from a coke oven by-product plant, containing cyanides and complex organic compounds are treated by a high density sludge process. The wastewaters are mixed with an aqueous high calcium lime slurry and a portion of the sludge formed in the process which is recycled in the process. The aqueous high calcium lime slurry and the portion of recycled sludge are mixed for a time to obtain a uniform mix. A solution containing iron is added to the uniform mix. Iron cyanide compounds and a portion of the complex organic compounds are precipitated. The precipitate is flocculated and is passed to a settling tank wherein the precipitate settles out to form a high density sludge. (Sinha-OEIS)
W75-05899

PROCESS FOR PRODUCING AND MAINTAINING PURIFIED, STERILE WATER,
Secretary of the Interior, Washington, D.C. (assignee)
K. C. D. Hickman.
U.S. Patent No. 3,860,494, 5 p, 13 fig, 17 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 841, January 14, 1975.

Descriptors: *Patents, *Water purification, *Distillation, Evaporation, Condensation, Water quality control, Recycling, *Waste water treatment.
Identifiers: *Sterilization.

A system for maintaining purified, sterile distilled water under a permanent blanket of steam in a storage vessel is disclosed. The improvement supplies fresh distillate to the storage vessel which is already substantially filled with steam-blanket distillate. Simultaneously some stored water is removed from the reservoir and recycled back to the still for repurification. Recycle conduits are positioned on the storage vessel to remove oldest water from the vessel. Heat transfer means or flow directing devices are provided to insure that water flows through the storage vessel in close approximation to plug flow. (Sinha-OEIS)
W75-05904

ION EXCHANGE WASTE WATER TREATMENT PROCESS,
Combustion Engineering, Inc., Windsor, Conn. (assignee)
D. L. Dixson, and B. A. Roche.
U.S. Patent No. 3,862,032, 6 p, 1 fig, 2 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1329, January 21, 1975.

Descriptors: *Patents, *Waste water treatment, *Demineralization, *Pollution abatement, *Ion exchange, Filtration, Resins, Anion exchange, Cation exchange, Water pollution control.

The waste water from the regeneration system of a demineralizer system is treated by ion exchange and filtration so that the water can be immediately reused in subsequent steps of the regeneration process. This reduces the amount of waste requiring further treatment before being released to the environment. The resin used to treat the water can either be exhausted resin from a demineralizer unit or regenerated resin. Some of the acid from the regeneration process may also be recovered for reuse. (Sinha-OEIS)
W75-05906

SLIME CONTROL COMPOSITIONS AND THEIR USE,
Betz Labs., Inc., Trevose, Pa. (assignee)
B. F. Shema, and R. H. Brink, Jr.
U.S. Patent No. 3,862,034, 5 p, 1 tab, 6 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1330, January 21, 1975.

Descriptors: *Patents, *Slime, *Water treatment, Fungi, Bacteria, Algae, *Microorganisms, *Pulp wastes, Pollution abatement, Industrial wastes.
Identifiers: Aerobacter aerogenes, Morpholine, Anilide, Biocides.

Processes and compositions useful for inhibiting the growth of slime in water and, in particular, water used for industrial purposes are described. The novel processes and compositions are processes or mixtures which show unexpected synergistic activity against microorganisms, including bacteria, fungi and algae, which produce slime in aqueous systems or bodies which are objectionable from either an operational or aesthetic point of view. Specifically the invention is directed to the use of compositions comprising a combination of N-2-nitrobutyl - morpholine and 3, 4', 5 - tribromosalicylanilide. (Sinha-OEIS)
W75-05907

LIQUID SUSPENSION PURIFYING UNIT,
K. R. W. Robinson.
U.S. Patent No. 3,862,041, 7 p, 13 fig, 12 ref; Official Gazette of the United States Patent Office, Vol 930, No 3, p 1332, January 21, 1975.

Descriptors: *Patents, *Pollution abatement, *Waste water treatment, *Pulp wastes, Suspension, Equipment, *Water purification, Liquid wastes, Industrial wastes.
Identifiers: Liquid purification, Hydrocyclones, Fiber suspensions.

One or more hydrocyclones are arranged in a common housing to form a liquid purifying unit. Each hydrocyclone has a casing having an inject inlet, for the suspension to be cleaned, an accept outlet and a reject outlet. The common housing is divided up so as to have an inject chamber, an accept chamber and a reject chamber. Each hydrocyclone is arranged so that each accept outlet is located at the bottom of the unit and each reject outlet is located at the top thereof, with reject outlet open above the surface of the liquid in the reject chamber. The reject chamber forms part of a closed circuit with the reject outlet connected to an outlet line in a manner to maintain a generally constant level of liquid in the reject chamber. This arrangement enables the outflow of reject in the reject chamber to be seen and also enables the unit to be incorporated in a closed system. (Sinha-OEIS)
W75-05908

THE COUNTESS WEAR SEWAGE-TREATMENT WORKS OF EXETER CITY COUNCIL,
Exeter Sewage Treatment Works (England).
J. A. Garry, K. A. Barrett, and A. Garton.
Water Pollution Control, Vol 73, No 3, p 321-324, 1974. 3 fig, 1 ref.

Descriptors: *Waste water treatment, *Sewage treatment, *Treatment facilities, Sludge disposal, Sludge treatment, Construction materials, Design criteria.
Identifiers: United Kingdom(Exeter City-Eng).

The present Exeter, U.K. sewage works designed for a population of 120,000 and completed in 1970 is described. A main interceptor sewer and treatment works are the central features for the new construction because problems of overloading and sludge treatment and disposal were becoming increasingly more troublesome. The sludge treatment and disposal method as well as the apparatus and procedure employed in the treatment method are described. (Sandoski-FIRL)
W75-05940

LIQUID FILTER SYSTEM HAVING AUTOMATIC FILTER BACK WASH CONTROL AND METHOD OF OPERATION,
T. M. Walters, and C. H. Brown.

U.S. Patent 3,826,368. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1218, July 30, 1974. 1 fig.

Descriptors: *Waste water treatment, *Filtration, *Filters, *Patents, Pressure, Solids, Liquids, Equipment, Screens, Operations.
Identifiers: *Back wash control.

A filter for removing solid particles from a fluid is described in which an inlet supplies the fluid to be filtered to one side of the screen. An outlet carries away the filtered fluid from the other side of the screen, where means coupled to the outlet are responsive to an absolute drop in normal pressure. These introduce a higher pressure back wash into the outlet. Additional means are coupled to the inlet responsive to an increase in normal pressure in the inlet for terminating the flow of back wash into the outlet. (Prague-FIRL)
W75-05941

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
Chemical Processing, Vol 20, No 5, p 22, May, 1974.

Descriptors: *Construction materials, *Plastics, Aeration, *Sewage treatment, Treatment facilities, Performance, *Waste water treatment, *Water treatment.

Oy Nokia AB developed two kinds of aerating elements made of Nopol 100 porous polyethylene for use in the aeration and purification of waste water, sludge, and for alleviating oxygen loss in lakes, rivers, and ponds. The HKP600 tube and the HKL210 disc and all other supporting component parts are made of plastics to withstand the corrosive effects of effluents and waste. The HKP600 has been installed in the factory built sewage treatment plant developed by Valmet Oy which operates on the activated sludge principle and is assembled on-site from interchangeable elements used for various functions and for plant extensions. This material repels water, absorbs oil, attracts dust, reduces noise, and can be molded in rod, tube, disc, and other shapes. Also it is unaffected by mineral acids, alkalis, alcohols, ketones, and aldehydes. (Sandoski-FIRL)
W75-05943

WASTEWATER TREATMENT FOR SMALL COMMUNITIES: PART TWO - SPECIAL DESIGN CONSIDERATIONS,
California Univ., Davis. Dept. of Civil Engineering.
G. Tchobanoglous.
Public Works, Vol 105, No 8, p 58-62, 98-99, August, 1974. 1 fig, 5 tab, 11 ref.

Descriptors: *Waste water treatment, *Operation and maintenance, Costs, Waste water(Pollution), Effluents, Environmental control, *Design.

A variety of processes have been developed that are suitable for the treatment of waste water from small communities. Due to variable local conditions, there is no best process that can be applied universally. Most important factors are the operation and maintenance requirements due to the budget limitations faced by most small cities. Selection of the process should be based on an analysis of the waste water characteristics, effluents requirements, costs, budgetary limitations, and assessment of local impacts. (Sandoski-FIRL)
W75-05944

NUTRITIONAL IRON-PROTEIN COMPLEXES FROM WASTE EFFLUENTS,
Department of Agriculture, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5E.
W75-05946

METHOD OF SEPARATING METALLIC CHLORIDES FROM AN AQUEOUS MIXTURE THEREOF,
Aktiebolaget Gullspang Elektrokemiska (Sweden). (assignee)
A. I. Aue, H. Reinhardt, J. H. A. Rydberg, B. Frolunds, and L. Skjutare.
U.S. Patent 3,824,161. Issued July 16, 1974. Official Gazette of the United States Patent Office, Vol 924, No 3, p 625, July 16, 1974. 1 fig.

Descriptors: *Separation techniques, *Waste treatment, *Patents, *Mixtures, *Chlorides, Metals, Extraction.
Identifiers: Metallic chlorides.

A method for separating one or more metallic chlorides from an acid aqueous mixture is described. It employs a multi-stage, selective extraction process and a water immiscible extraction agent which consists of a solution of an amine capable of forming extractable compounds with the metallic chlorides. Subsequently the metallic chloride or chlorides are washed out of the mixture. (Prague-FIRL)
W75-05947

FULL FLOW FLUID FILTER,
California Inst. of Tech., Pasadena. (assignee)
L. Troth, R. Hagler, and O. Keller.
U.S. Patent 3,827,568. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 138-139, August 6, 1974. 1 fig.

Descriptors: *Waste water treatment, *Patents, *Filters, Flow, Fluid mechanics, Equipment, *Filtration, Sediments, Detritus, Sediment load, Sedimentation, *Suspended load, *Suspended solids, Water pollution sources.
Identifiers: Particulate impurities removal.

A filter has been designed to remove particulate impurities from a fluid. It is a hollow, generally cylindrical housing having axial fluid channels along the inner surface and open opposite ends forming an inlet and an outlet for the filter. Several annular, generally disc-shaped filter elements are tightly stacked within the housing. The outer edges of the filter elements bear on the inner surface of the housing and combine to form the axial fluid channels while the inner edges of the filter elements combine to form a hollow inner core communicating with one of the open ends of the housing. Each filter element includes radial channels between the axial channels and the hollow inner core. Each channel has a low-velocity pocket for trapping particulate impurities in a fluid flowing along. One end of the hollow inner core is blocked so that the path for fluid flowing between the inlet and outlet is through the axial and radial channels and the hollow inner core. (Orr-FIRL)
W75-05948

METHOD FOR THE DISPOSAL OF COMBUSTIBLE AND DILUTE AQUEOUS WASTES,
Atomic Energy Commission, Washington, D.C. (assignee)
E. Grimmett, and P. Lamont.
U.S. Patent 3,827,946. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 233, August 6, 1974. 1 fig.

Descriptors: *Waste disposal, *Waste water treatment, *Patents, *Water reuse, *Potable water, Reclaimed water, Evaporators, Equipment, Water pollution treatment, Water supply, Steam, Potable water.
Identifiers: Steam power, Aqueous waste disposal, Steam generator.

A method for the disposal of combustible and dilute aqueous wastes produces both potable water and useful power. Combustible waste, together with conventional fuel, is burned in a fluidized-bed steam generator; the steam produced is used to evaporate dilute aqueous wastes in the first stage of a two-stage fluidized-bed evaporator. The steam in the first stage is used to evaporate dilute aqueous wastes in the second stage of the two-stage fluidized-bed steam generator; the steam produced in the second stage is used to generate power. Spent steam from the first and second fluidized-bed evaporators is condensed as potable water. (Orr-FIRL)
W75-05949

APPARATUS FOR REMOVAL OF CONTAMINANTS FROM WASTES,
K. Okubo, and A. Ueno.
U.S. Patent 3,827,964. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 236-237, August 6, 1974. 1 fig.

Descriptors: *Patents, *Waste water treatment, *Separation techniques, Equipment, Electricity, *Electrolytes, Suspended load, Suspended solids.
Identifiers: Contaminant removal, Electrolyte cell.

Apparatus consists of an electrolytic cell partitioned by a membrane into two electrolytic chambers. The chambers are filled with electric conductors in a granular or fibrous form with positive and negative major electrodes respectively thereby forming an anode chamber and a cathode chamber in abutting relation through the membrane. The anode chamber or the cathode chamber which are filled with the granular or fibrous conductors with major electrodes may be replaced by a porous conductive metal sleeve. (Orr-FIRL)
W75-05950

METHOD OF INTRODUCING OXYGEN INTO A LIQUID TO BE CLARIFIED AND DEVICE FOR CARRYING THE METHOD INTO EFFECT,
J. Kaelin.
U.S. Patent 3,827,679. Issued August 6, 1974. Official Gazette of the United States Patent Office, Vol 925, No 1, p 168, August 6, 1974. 1 fig.

Descriptors: *Waste water treatment, *Patents, *Oxygen, Aerobic treatment, Water pollution treatment, Water treatment, Sewage, Sewage treatment, Oxidation, Sanitary engineering, Water supply.
Identifiers: *Clarification plants, Activation tanks.

A method of introducing oxygen into a liquid located in an activation tank of a clarification plant is described. The liquid is circulated in toroidal flows. Oxygen or air is then bubbled through. (Orr-FIRL)
W75-05951

THE PROPERTIES AND COMPOSITION OF SLUDGES,
National Environmental Research Center, Ohio. Advanced Waste Treatment Research Lab.
For primary bibliographic entry see Field 5A.
W75-06033

STORM AND COMBINED SEWER RESEARCH AND DEVELOPMENT,
Federal Water Pollution Control Administration, Washington, D.C.
For primary bibliographic entry see Field 8C.
W75-06049

WATER QUALITY DECISION MAKING IN ATLANTA, GEORGIA, THREE RIVERS STUDY,
Black, Crow and Eidsness, Inc., Atlanta, Ga., and Atlanta Public Works Dept., Ga.
A. I. Perez, and G. D. Barnes.
In: Proceedings of Fourth Annual Environmental Engineering and Science Conference, Louisville, Kentucky, March 4-5, 1974. p 41-57, 5 fig, 5 tab, 6 ref.

Descriptors: *Decision making, *Water pollution control, *Sewage treatment, *Waste water disposal, *Alternate planning, Environmental engineering, Sanitary engineering, Water quality standards, Sewage effluents, Combined sewers, Overflow, Water quality control, Georgia, Treatment facilities, River basins.
Identifiers: *Atlanta(Georgia), West Point Reservoir, South River, Flint River, Chattachoochee River.

In August, 1972, the Georgia Water Quality Control Board directed the City of Atlanta to develop a program to comply with new effluent standards for discharges to the South River Basin to provide adequate treatment for combined sewer overflows in the South River Drainage Area. The analysis of alternate solutions has been completed and the recommended program has been submitted to the State for preliminary review. The factors which were considered in selecting an optimum plan for meeting present and possible future water quality standards were included with the recommendations. When Atlanta began the major improvement program to provide secondary treatment as required by the State, the City believed that the new facilities would be adequate to meet standards. Neither the City nor the regulatory agencies can afford to put forth the efforts and finances to implement another major water pollution control program without assurance that such a program will not become inadequate before it is even completed. Effective regional planning and consideration of all viable alternatives is essential if meaningful pollution abatement programs are to be developed. Implementation of the proposed plan will result in the elimination of discharges from the City's treatment facilities in the South River and Flint River Basins. (Poertner)
W75-06058

AUTOMATION OF THE CONTINUOUS COAGULATION MONITOR,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5F.
W75-06074

DEVELOPMENT OF A METHOD FOR MEASURING DISSOLVED COLOR IN WASTEWATERS AND RECEIVING STREAMS,
Dept. of Environmental Systems Engineering. Clemson Univ., S.C.
For primary bibliographic entry see Field 5A.
W75-06086

WATER MANAGEMENT IN LIVESTOCK WASTE HANDLING SYSTEMS,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
C. L. Barth, and J. H. Bond.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 856, $4.75 in paper copy, $2.25 in microfiche. South Carolina Water Resources Research Institute, Clemson, Report No. 51, January 1975. 87 p, 35 fig, 11 tab, 23 ref. OWRT A-025-SC(2).

Descriptors: *Waste water treatment, Water management(Applied), *Farm wastes, *Farm lagoons, Aerobic conditions, *Anaerobic conditions, *Hogs, Liquid wastes, *Salmonella, *Mathematical models, *Water reuse, Water conservation, Waste storage, Waste treatment.

The potential for minimizing the use of water in several animal waste treatment and storage procedures was evaluated. Laboratory units simulated the operation of aerobic lagoons, anaerobic lagoons, and storage for diluted swine feeding floor waste under conditions of controlled temperature, lighting, loading rate and detention time. Reduction of volatile solids (VS) content under conditions similar to those of aerobic lagoons was limited due to algae production. Anaerobic lagoon simulators achieved volatile solids reduction rates of 75.8% at 24C and 200 days detention time and as little as 22.1% at 10C and 100 days detention time. Degradation of VS was generally high in the loading rate range of 50 to 400 g VS/day-m3 and sludge storage efficiency was also high in that range. Liquefaction was a significant factor in the storage simulators with reductions of total solids by as much as 69%. Survival of the swine pathogens Salmonella cholerae-suis and Salmonella typhimurium in laboratory simulators of swine manure lagoons was determined and compared with the survival of the indicator organisms Escherichia coli and fecal coliforms. The heaviest populations of the pathogens died off in 33 days. A cause for Salmonella die-off was proposed. A mathematical model was developed to describe the operation of the anaerobic animal waste lagoon and compared with relevant data which characterized the lagoon simulators. The symbiotic relationship of the acid formers (facultative heterotrophs) and methane formers (obligate anaerobes) was emphasized along with the possible inhibition of both cultures by high concentrations of volatile organic acids.
W75-06087

AN EVALUATION OF THE EFFECTIVENESS AND APPLICABILITY OF PHYSICAL-CHEMICAL TREATMENT OF URBAN LAND RUNOFF,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
P. Samar.
PhD Thesis, 158 p. 52 fig, 26 tab, 67 ref, 5 append. EPA No 11030 HJP.

Descriptors: *Urban runoff, *Coagulation, *Flocculation, Sedimentation, *Chemical precipitation, *North Carolina, *Waste water treatment, Evaluation, *Sludge treatment, Polyelectrolytes.
Identifiers: Durham(NC), *Physical-chemical treatment, Alum.

A physical-chemical treatment comprising coagulation and flocculation, sedimentation, and sludge handling was developed and applied to urban land runoff. The study deals with selecting an efficient coagulant, assessing the parameters involved, and evaluating criteria for efficient treatment. A number of organic and inorganic coagulants were evaluated in jar test analyses. The most efficient coagulants in terms of removal of suspended solids, COD, and turbidity were alum and the cationic polyelectrolyte Calgon 2660. The parameters involved in treatment with the coagulants were initial suspended solids, alkalinity, and mixing conditions. Based on the parameters mentioned and characteristics of the individual coagulant, alum was selected as the best coagulant for treatment of urban land runoff. The effect of scale up was evaluated in a long tube sedimentation study for each coagulant. Scale up did not influence the choice of coagulants or mixing conditions. Sludge characteristics were studied by evaluating the density, resistivity, and solid content of the sludge. (Stewart-North Carolina State)
W75-06094

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
J. H. Sims, and D. D. Baumann.
Water Resources Research, Vol 10, No 4, p 659-665, August, 1974. 2 fig, 6 tab, 15 ref. OWRT C-2178(H3379)(2).

Descriptors: *Psychological aspects, *Reclaimed water, *Potable water, *Water supply, *Attitudes, Water treatment, Water types, Effluents, Impaired water use, Waste water treatment, Water pollution control, Motivation, Decision-making, Social aspects, Water sources, Water utilization, Water quality, Water consumption, Water reuse.
Identifiers: Kokomo(Indiana), Lubbock(Texas), San Angelo(Texas), Colorado Springs(Colorado), Santee(California), Human behavior, Psychology.

Since no program using renovated wastewater can be initiated without public acceptance, it is crucial that the public's responses be identified. A study of attitudes of 400 respondents in five communities considering recycling renovated wastewater (Kokomo, Ind.; Lubbock and San Angelo, Tex.; Colorado Springs, Colo.; and Santee, Calif.) shows people's attitudes depend on the amount of knowledge they have about wastewater reuse and their general level of education rather than upon unconscious fears of contamination or beliefs about technology, aesthetics, progress, authority, nature, or destiny. Half of the sample would drink renovated water, 78-81% accepted use for body contact (swimming, washing), 94% accepted use for industrial cooling, and 96% accepted it for irrigation. The extremely positive attitudes are questioned since they might reflect the respondents' desire to be ecologically responsible, especially since the questions were hypothetical. However, the study results are encouraging in that there appears to be less psychological resistance to adopting renovated wastewater for potable use than was expected. In addition, the data show that information campaigns would be effective for encouraging public support. (Grden-North Carolina)
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
D. D. Baumann, and R. E. Kasperson.
Water Resources Research, Vol 10, No 4, p 667-674, August, 1974. 3 fig, 3 tab, 37 ref. OWRT C-2178(3379)(3).

Descriptors: *Psychological aspects, *Water quality, *Waste water treatment, *Potable water, *Attitudes, Behavior, Fluoridation, Chlorination, Waste treatment, Waste water disposal, Water pollution, Water pollution treatment, Waste dilution, Water treatment, Water supply, Water demand, Water requirements, Water storage, Water reuse.
Identifiers: *Human behavior, *Public acceptance, Public works.

Although wastewater treatment technologies have greatly improved during the last decade, adoption of water reuse to supplement municipal water supplies has not been extensively assessed. Controversy exists over the public health hazard involved with direct use of renovated water for potable purposes, but recent progress in treatment technologies, combined with natural buffers, makes direct reuse tenable. Implementaing wastewater renovation and reuse systems would not only alleviate water shortages, but would improve stream quality. The potential obstacle of public acceptance should be examined; the chlorination and fluoridation experiences provide sufficient precedent for concern. For example, although chlorination is inexpensive and an effective disinfectant, fifty year elapsed before 90% of the public water supplies were chlorinated due to acceptance factors. However, recent studies of public attitudes towards water reuse provide some basis for optimism. Evidence suggests that with proper education and exposure to wastewater renovation, with a sequential experience with a hierarchy of uses, and with support from local health, scientific, water supply, and water treatment personnel, community support can be obtained. It is also necessary to understand why the myth of public unacceptance of wastewater reuse arose in the first place. (Grden-North Carolina)
W75-06097

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
Prepared for City of Fresno, California, August, 1971. 28 p, 6 fig, 9 tab.

Descriptors: *Sewers, *Sewage, *Sewage districts, Waste water(Pollution), *Waste water disposal, Waste disposal, Storm drains, Drainage systems, *California.
Identifiers: *Fresno(Calif.), Metropolitan Fresno Sewer System.

In addition to presenting long range planning for the City of Fresno Sewer System, the report incorporates seven systems in outlying areas and project requirements for the metro system to the years 1985 and 2015. Present system characteristics (plant flow records, industrial discharges, water metering, storm drainage), future population and land use characteristics, and projected units flows are analyzed. Sewer system improvements are suggested to meet the needs of the estimated 495,000 population in 1985 and 945,000 population in 2015. A diagram showing 1985 needs reveals that all proposed lines are outside the present sewer system indicating that with a few exceptions the present system will be adequate to 1985. New lines will be necessary to accomodate the 2015 requirements, since by that time all existing north and south trunk lines and trunks flowing to the west will be overloaded. Individual trunk lines are discussed for both time parameters. Additional recommendations include elimination of connections to storm water inlets, universal installaion of water meters, interior protective coating for all concrete sewer pipe to be installed, and construction of larger than presently necessary lines to provide for future needs. (Park-North Carolina)
W75-06102

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-231 449, $8.75 in paper copy; $2.25 in microfiche. February, 1973. 302 p, 34 fig, 9 tab, 58 ref, 5 append. MIP-336-372.

Descriptors: *Sewage disposal, *Water supply, *Waste water treatment, *Waste water disposal, *Water supply, Water storage, Water management(Applied), Water quality, *Michigan, Water distribution, Sewers, Sewage districts.
Identifiers: Antrim County(Mich.), Benzie County(Mich.), Charlevoix County(Mich.), Emmet County(Mich.), Grand Traverse County(Mich.), Kalkaska County(Mich.), Leelanau County(Mich.), Manister County(Mich.), Missaukee County(Mich.), Wexford County(Mich.).

Present conditions and future requirements of water supply and wastewater control are investigated for an area consisting of 10 counties, Antrim, Benzie, Charlevoix, Emmet, Grand Traverse, Kalkaska, Leelanau, Manister, Missaukee, and Wexford, with growth projected from 1970 to 1990 of 50,000 to 209,000. The area has been popular for second homes with a minimal burden to water problems. Permanent urbanization, especially in Grand Traverse County and City, is projected. Goals and objectives developed served as a basis for developing the plan and are intended to be used by local governments in helping to determine local policy. Factors considered including existing facilities (primarily individual system), water quality standards maintenance, land use controls, and specific community needs are delineated within each county for both water and wastewater systems. Proposals include consolidation of some wastewater facilities, expansion of service areas, and construction of new or upgrading present water storage facilities, trunk lines, and treatment facilities. Cost estimates are given by locality and funding mechanisms are proposed (federal and state grants, revenue, special assessment, and general obligation bonds, and allocation of current revenues). (Park-North Carolina)
W75-06106

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-SC-73-0887-F, $5.75 in paper copy, $2.25 in microfiche. May 1973. 141 p, 12 fig, 15 tab.

Descriptors: Environmental effects, *Urbanization, *Sewage treatment, *Sewage disposal, *South Carolina, Future planning(Projected), Waste water treatment, Atlantic Coastal Plain, Southeast United States, Water policy, Land use, Utilities, Sewers, Interceptor sewer, Federal government, Local governments, Governmental Interrelations, Land management, Water resources development.
Identifiers: *Environmental Impact Statements, *Florence(SC).

The city of Florence, South Carolina, plans to extend water and sewer service to the west of the city. Florence serves as the focal point of the region known as the Great Pee Dee River Basin which defines a natural unit for planning and development. The project area is essentially undeveloped land, approximately one third of which was used for farming, but now lies fallow. The project's major impact will be the gradual urbanization over the next twenty five years of 3,450 acres of rural land. Increases in noise level, auto and other air emissions and congestion will accompany development. The runoff from the developing area will carry contaminants to Jeffries Creek and the small game population now living in the area will be forced to emigrate. Compliance with air and water standards will mitigate the adverse effects of urbanization. The project will stimulate development of the project land and will not irreversibly or irretrievably commit any scare resource within the Pee Dee Basin. The alternative of no action was rejected, and there is no significant opposition to the project. (Deckert-Florida)
W75-06181

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-FL-73-1489-F, $7.60 in paper copy, $2.25 in microfiche. September 11, 1973. 285 p, 7 map, 11 tab.

Descriptors: *Florida, *Waste water treatment, *Waste water disposal, *Waste disposal, *Waste treatment, Waste water(Pollution), Sewage, Sewage disposal, Sewage treatment, Outfall, Sewers, Sewerage, Construction, Water pollution sources.
Identifiers: *Environmental Impact Statements, *Dade County(Fla).

The project consists of construction of wastewater pumping stations, waste water force mains, a waste water treatment plant and a waste water treatment plant outfall in Central Dade County, Florida. Unavoidable adverse effects related to the construction of the facility including noise, traffic, and the stripping of trees and foliage, will be minimized by pursuing construction precautions. The elimination of 31 waste water pollution sources which currently discharge waste water to inland canals and bays will reduce potential health hazards, and eliminate nuisances such as odors and unsightly conditions. In addition the project will eliminate the discharge of 32 million gallons of sewage a day by septic tanks to the Biscayne Aquifer reducing the possibility of groundwater contamination. The treatment of waste water will be raised to 90% of total treatment and will be discharged 18,000 feet offshore improving near shore ocean water quality. Feasible alternatives include exclusion of saline infiltration, effluent disposal techniques, sludge treatment and disposal methods or no action. (Denvir-Florida)
W75-06183

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
R. S. McAvoy.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 884, $7.50 in paper copy, $2.25 in microfiche. MSc thesis, December 1973. 136 p, 17 fig, 31 tab, 13 ref, 2 append. OWRT B-035-PA(4). 14-31-0001-3327.

Descriptors: *Planning *Decision making, Financial feasibility, *Pennsylvania, Administration, Economies of scale, Alternative costs, *Regional analysis, Waste water treatment, Treatment facilities, Optimization, *Optimum development plans.
Identifiers: Regionalization, *Waste management systems, Community leadership, Waste water plans, Community size, Regional alternatives.

A procedure provides for the generation of alternate schemes for the regionalization of a geographic area for locating waste-water treatment facilities. An integral part of the procedure is the degree of involvement of the decision makers, the community leaders, in it. They make their preferences known concerning their municipality. These characteristics or basic decision units of the municipality are the quantitative measure (Affinity Coefficient Sets) of the relationships which exist between communities. These sets are ordered by Paired Comparisons and weighted so each decision maker's individual preferences can be accounted for. A Combined Affinity Coefficient Set is produced for each set of Affinity Coefficient Sets chosen as decision criteria. The Combined Affinity Coefficient Set is partitioned into two sets, those municipalities which are the components of a regionalization scheme and those which are not. This partitioning is accomplished by using the barrier value which is subjective and depends solely on the decision makers. (Sink-Penn State)
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
D. J. Palm.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 935, $5.75 in paper copy, $2.25 in microfiche. PhD Dissertation, December 1972. 130 p, 8 fig, 18 tab, 75 ref, append. OWRT B-035-PA(3). 14-31-0001-3327.

Descriptors: *Planning, *Administration, *Pennsylvania, Decision making, Financial feasibility, Economies of scale, *Alternative costs, *Regional analysis, Waste water treatment, Sewage treatment, Treatment facilities, *Cost comparisons.
Identifiers: Regionalization, *Waste management systems, Waste water plans, Community size, Regional alternatives, Economic criteria.

The development of economic criteria for regionalization of waste water management systems reported in this study was part of an interdisciplinary research effort concerned with the development of criteria for regionalization of water supply and waste water management systems. The study's central hypothesis was that economies of size would result through the regionalization process which was supported by the findings of the analysis. The factors of prime importance influencing the magnitude of reductions were the size of the sewage treatment plant and the distance the effluent had to be transported given the spatial

distribution of the effluent generators within the area to be serviced. The estimated costs of immediate regionalization exceed those of phased regionalization. It was concluded that the costs of developing a regional system from the existing systems within the study area were very small relative to the reduction in cost achievable by regionalization. (Sink-Penn State)
W75-06200

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
R. E. Markland, L. D. Smith, and J. D. Becker.
Available from University of Missouri, St. Louis, $6.00 for paper copy. Also, available from the National Technical Information Service, Springfield, Va 22161 as PB-240 991, $7.50 in paper copy, $2.25 in microfiche. Technical Completion Report, December 31, 1974. 141 p, 19 fig, 15 tab, 65 ref, 5 append. OWRT C-5302(4221)(1). 14-31-0001-4221.

Descriptors: *Return flow, *Waste water disposal, *Waste water treatment, *Long-term planning, *Alternative planning, *Mathematical models, *Land use, Sewage disposal, Computer models, Decision making, Estimated benefits, Estimated costs, Regional development, Optimization, Investment, Cost comparisons, *Cost-benefit analysis, Project planning, Mathematical studies, Water reuse, Waste water(Pollution), *Missouri.
Identifiers: *St. Louis(Mo), Standard Metropolitan Statistical Areas, Mixed integer programming, Land disposal wastewater treatment site selection, Land use forecasting, Urban land use.

A large scale mixed integer programming model for the selection of land disposal wastewater treatment sites was developed and tested for the St. Louis Standard Metropolitan Statistical Area (SMSA). Initially, some thirty-one potential land disposal sites within the St. Louis SMSA were isolated, utilizing a previously developed land use forecasting model. Next, the mathematical framework of the model was developed, as various technical, economic, capital, pollution, and engineering constraints were constructed, and the model's objective function was derived in a manner in which the net present value of all capital investment costs, operating costs, benefits, and the salvage value resulting from the construction of the various land disposal wastewater treatment sites was minimized. The model was then computerized, calibrated, and tested, using data developed for each of the potential land disposal sites within this region. Analysis of the test results indicated the model's general usefulness as a means of performing a large scale, regional, benefit/cost analysis for a set of potential land disposal wastewater treatment sites. The solution to the model provided the basis for a regional plan for land disposal wastewater site development, over a fifty year time horizon.
W75-06203

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5A.
W75-06216

CHARACTERIZATION OF WASTEWATERS FROM THE ETHICAL PHARMACEUTICAL INDUSTRY,
Gulf South Research Inst., Baton Rouge, La.
For primary bibliographic entry see Field 5A.
W75-06244

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
For primary bibliographic entry see Field 5B.
W75-06249

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
J. Barnard, N. W. Hines, and L. H. Mashaw.
Available from the National Technical Information Service, Springfield, Virginia 22161, as PB-240 945, $4.75 in paper copy, $2.25 in microfiche. Final Report, October 1973. 75 p, 2 fig, 4 tab. OWRT C-3227(No 3703)(1).

Descriptors: *Storm drains, *Assessments, Legal aspects, Water pollution control, Economics, Evaluation, Construction, *Financing, Engineering structures, Treatment facilities, *Combined sewers, Conveyance structures, Benefits, Cost-benefit analysis, *Financial feasibility.
Identifiers: *Benefit-assessment method, Special assessments.

The legal and engineering aspects of financing storm sewer construction through special assessments are examined. In considering the utility of the special assessment for this purpose, the nature of the special assessment and its declining popularity as a financing technique has been described. Three explanations for the relative disuse of special assessments are then identified and analyzed separately. The legal status of the special assessment is surveyed on a nationwide basis, addressing both the authorization for and actual use of the device. Various procedural requirements are discussed and a model assessment process is described. Then the legal rules and engineering procedures involved in establishing a proper relationship between an assessment and a special benefit derived by the affected property are explored as a background for an evaluation of current prodedures for determining assessments. Finally, a rational benefit-assessment method is proposed and its operation is illustrated with a simulated assessment case.
W75-06297

A PROPOSED STRUCTURE OF AN ALUMINUM-PHOSPHATE SPECIES OF IMPORTANCE IN WASTEWATER TREATMENT,
Towill (R. M.) Corp., Honolulu, Hawaii.
B. H. H. Chen, P. H. King, and C. W. Randall.
Environmental Letters, Vol 6, No 2, p 129-138, 1974. 2 fig, 1 tab, 6 ref. OWRT A-040-VA(2).

Descriptors: *Chemical precipitation, *Aluminum, *Phosphates, *Waste removal, *Tertiary treatment, Phosphorus compounds, Laboratory tests, *Waste water treatment.

The purpose was to determine the aluminum phosphate species formed in wastewater treatment at pH 5.0. Although the constituents were not as diverse as those in normal waste water, the experimental procedures and chemical concentrations were selected to simulate as closely as possible the practical situation. The aluminum/hydroxide/phosphate molar ratio in the precipitates at pH 5.0 was 13/10/9. The species formulated in the precipitates may vary or even be a combination of several different species, but the most likely formula is A1 13(OH)30(H2P04)9-18H20. The aluminum/phosphate molar ratio for optimum phosphate removal at pH 5.0 was 1.44. Since there are many competing and interferring organic and inorganic constituents in wastewater, other than those chemicals used in this experiment, the practical aluminum/phosphate molar ratio for optimum phosphate removal is expected to be higher than 1.44. The system pH throughout the experiment was set at 5.0. Future investigations should look into the pH range from 5.0 to 7.0, which applies to most practical situations. (Jernigan-Vanderbilt)
W75-06300

PRETREATMENT STANDARDS FOR DISCHARGE,
L. C. Gibney.
Environmental Science and Technology, Vol 8, No 7, p 613, July, 1974, 1 tab.

Descriptors: *Waste treatment, *Standards, *Industrial wastes, *Effluents, Federal government, Sampling, Chromium, Copper, Zinc, Nickel, Cadmium, Iron, Lead, Cyanide, Water quality standards, *Pre-treatment(Water), Waste water treatment.

Until recently, pretreatment guidelines for pollutents entering waterways had been developed by the federal government. Now, pretreatment standards are being promulgated for 31 industries. Specifically prohibited wastes listed by the EPA encompassed wastes which are inflammable, corrosive to the treatment plant's structure, obstructive to the sewer's flow and have an excessive flow or discharge rate. The EPA requires that major contributing industries pretreat, their incompatible pollutants with the best practicable control technology. (Jernigan-Vanderbilt)
W75-06313

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
N. A. Curry.
In 27th Industrial Waste Conference, Purdue University, West Lafayette, Indiana, May 2-4, 1972. 29 p, 3 tab, 5 ref.

Descriptors: *Heavy metals, *Waste treatment, *Regulations, *Water pollution, Toxicity, Evaporation, Recycling, Concentrations, Precipitation, Neutralization, Clarification, Sludge, Effluent, Solubility, Oxidation, Reverse osmosis, Contamination, Incineration, Sanitary fill.

Steps to be taken to reduce the amount of pollutant in a discharge is discussed, assuming that some discharge is required in the process. In any such process, the amount of pollutant is the product of the amount of flow and of the concentration of the pollutant in the flow. Reduction in either the flow or the concentration will reduce the pounds of pollution in the discharge. Seven rules are presented and discussed concerning the reduction of pollutants: I. Omit flows with a pollution concentration lower than the concentration in equilibrium with the precipitate formed; II. Reduce the waste volumes requiring treatment-static fog or spray rinses, counter-current flow; III. Minimize the solubility of the pollutant (a) eliminate compounds that form soluble complexes (b) reduce concentration of interfering ions that increase the pollutant ion solubility (c) maintain conditions that minimize total solubility; IV. Control conditions to increase the proportion of pollutant in the ionic form required for its precipitation or adsorption; V. Avoid conditions that will form toxic gases during treatment; VI. Select a process that will give the lowest practical concentration of pollutant in the effluent; VII. Select process that gives a sludge that can be disposed with minimum danger of contamination of the environment. (Rowe-Vanderbilt)
W75-06320

OPERATIONAL CONTROL AND PLANT PERFORMANCE OF THE HAMPTON ROADS SANITATION DISTRICTS AT WILLIAMSBURG WASTE TREATMENT PLANT.
National Field Investigations Center, Cincinnati, Ohio.
February 1973. 60 p, 10 fig, 8 tab, 3 append.

Descriptors: *Treatment facilities, *Wastewater treatment, *Activated sludge, Domestic wastes, Sewage treatment, Water pollution sources, Quality control, *Virginia, Biochemical oxygen demand.

Identifiers: *Brewery wastes, *Williamsburg(Va), Operational control.

A technical assistance project was conducted at the Williamsburg Waste Treatment Plant, Williamsburg, Virginia, to demonstrate the start-up and operational control procedures of a treatment plant. Included are descriptions of the facilities, waste characteristics, sample collection and analysis, operational control methods, and also suggested plant modifications and recommendations. The Williamsburg Waste Treatment plant is an activated sludge plant designed to treat 9.6 mgd of combined brewery and domestic waste. Reductions in BOD5 averaged 97 percent for the project and reductions in the suspended solids averaged 92 percent. The oprational control tests that were used to monitor plant performance permitted process imbalances to be quickly recognized and corrected. (Orr-FIRL)
W75-06341

UTILIZATION OF ACTIVATED SLUDGE (ISPOL'ZOVANIE AKTIVNOGO ILA),
Khorskii Gidroliznyi Zavod (USSR).
A. P. Dolzhenko.
Gidroliznaya i Lesokhimicheskaya Promyshlennost', No 6, p 29, 1974.

Descriptors: *Sludge disposal, *Activated sludge, *Yeasts, Ultimate disposal, Proteins, Vitamins, Nutrients, Water pollution sources, Waste disposal, Industrial wastes, Wastes, Hydrolysis, Effluents, Water purification.
Identifiers: Minerals.

At the Khorsk hydrolysis plant, activated sludge from secondary sedimentation tanks is used as an additive for feed yeast suspensions. The sludge is added prior to drying in an amount of 15%. The additive enriches the yeast with proteins, B group vitamins, and minerals. In addition, the activated sludge reduces the risk of bursting during yeast drying and increases the yeast yield by 200 kg/ton of dry raw material. Another advantage is an improved mechanical purification of the plant effluents, as all ponds can be used for sludge from primary tanks. (Stapinski-IPC)
W75-06344

STATE OF THE ART OF THE WATER PREPARATION TECHNOLOGY IN THE USSR (DER GEGENWAERTIGE STAND DER WASSERAUFBEREITUNGS TECHNOLOGIE IN DER UDSSR),
J. B. Bagozkij.
Wasserwirtschaft-Wassertechnik, Vol 24, No 6, p 184-187, 1974. 6 fig, 2 tab.

Descriptors: *Potable water, *Flocculation, Design criteria, Filters, Ozonation, Lime sludge, Equipment, Ozone, Turbidity, Aluminum sulfate, Color.

Latest achievments in drinking-water preparation technology in the UDSSR were surveyed. The use of new flocculants and flocculation aids, design improvements, the use of new filter materials and layer filter designs, as well as the use of modern integrated analytical instruments for automatic process control are the basic trends of the technological development. Aluminum sulfate with 14-15 percent active alumina, and, less often, iron chloride are used as flocculants, combined with activated silicic acid and polyacrylamide as flocculation aids. The minimum interval between the flocculant and flocculation dosaging is 30 to 90 seconds, depending on the water temperature. The aggressivity of the water as caused by the flocculants is eliminated by slaked lime. Ozone is used as a reagent for the elimination of slight coloration and turbidity in the ozonization-filtration-ozonization or chlorination scheme, or for the improvement of the organoleptic properties of the drinking water. Ozonization alone is sufficient if the turbidity and coloration of the raw water do not exceed 6 mg/liter and 60 degrees, respectively. The sludge contact process and reverse filtration for the better utilization of the sludge retention capacity of the filter are among principal equipment design improvements. (Takaes-FIRL)
W75-06346

WASTE OIL RECOVERY PRACTICES–STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
December, 1972. 250 p, 39 fig, 46 tab, 128 ref, 3 append.

Descriptors: *Oil wastes, *Oil pollution, Fuels, Industrial wastes, Gasoline, Waste disposal, *Maryland, Water pollution sources, Economics, Legislation, Water pollution control, *Reviews.
Identifiers: *Waste oil production, *Waste oil re-refining, Acid/clay re-refining.

A study of waste oil production, collection, reprocessing, re-refining and disposal was performed primarily on the state of Maryland. Data is presented on the origin and amounts of waste automotive, industrial and other waste oils. The effect of changing gasoline lead concentration on waste crankcase oils is found to be significant with respect to future uses of such waste oils. The exact fate of waste oils within Maryland is being investigated. Methods for purifying, re-refining, reprocessing or disposing of waste oils of several types are given. The predominant process for re-refining waste crankcase oils is the acid/clay method using sulfuric acid and adsorbent clays. Newer processes reducing or eliminating the need for acids or clay are being tried. When the burning of waste oils for heat recovery or incineration is practiced, metallic compounds in the oil may pose a health hazard if released to the atmosphere. Waste oil reprocessing is generally not economically feasible because of high collection costs, low process yields, small plant operations and unfavorable legislation. (Orr-FIRL)
W75-06347

5E. Ultimate Disposal Of Wastes

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

METHODS AND MACHINES.
Mining Journal, Vol 283, No 7249, p 74-75, July 26, 1974. 1 fig.

Descriptors: *Waste water treatment, Waste disposal, Dam construction, *Mining, *Water pollution control, Operations, Equipment.
Identifiers: United Kingdom.

The Kaolin mining operation, Cornwall, U.K., produces two million tons per year of micaceous fines from the processing stage. A tailings disposal scheme to prevent further pollution from this source includes the Kernick Dam, now under construction. The basis of the system is to utilize disused clay pits in the area by pumping fines into them and allowing settlement to occur. The disposal system consists of a 12-mile network of pipelines and includes twelve positive displacement pumps and a number of centrifugal pumps. (Sandoski-FIRL)
W75-05942

NUTRITIONAL IRON-PROTEIN COMPLEXES FROM WASTE EFFLUENTS,
Department of Agriculture, Washington, D.C. (assignee)
S. B. Jones, E. B. Kalan, T. C. Jones, and F. Hazel.
U.S. Patent 3,823,127. Issued July 9, 1974. Official Gazette of the United States Patent Office, Vol 924, No 2, p 348, July 9, 1974.

Descriptors: *Waste water treatment, *Patents, *Proteins, Iron, Industrial wastes, Effluents, Water reuse, Food, Recycling.
Identifiers: Ferripolyphosphates, Food additives.

Proteins may be precipitated and recovered from industrial waste effluents such as whey by the addition of Ferripolyphosphate to the effluents. The recovered product, a Ferripolyphosphate-protein complex in powder form, contains from 8 to 15 percent iron and from 15 to 50 percent protein. It is highly nutritional and highly assimilable, and has great potential as an iron-protein enriching additive in food and other products. (Prague-FIRL)
W75-05946

METHOD FOR THE DISPOSAL OF COMBUSTIBLE AND DILUTE AQUEOUS WASTES,
Atomic Energy Commission, Washington, D.C. (assignee)
For primary bibliographic entry see Field 5D.
W75-05949

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

WATER SURVEILLANCE PROGRAM, EGLIN AFB FL,
Environmental Health Lab., Kelly AFB, Tex.
For primary bibliographic entry see Field 5A.
W75-06216

PESTICIDE PYROLYSIS DEVICE,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 5G.
W75-06227

SURVIVAL OF VIRUSES AND BACTERIA IN A SIMULATED SANITARY LANDFILL,
Illinois Univ., Urbana. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5B.

W75-06231

WATERBORNE WASTES OF THE PAINT AND INORGANIC PIGMENTS INDUSTRIES,
Southern Research Inst., Birmingham, Ala.
For primary bibliographic entry see Field 5B.
W75-06249

PHILOSOPHY AND METHODOLOGY OF METALLIC WASTE TREATMENT,
New York State Dept. of Environmental Conservation, Albany. Bureau of Industrial Wastes.
For primary bibliographic entry see Field 5D.
W75-06320

UTILIZATION OF ACTIVATED SLUDGE (ISPOL'ZOVANIE AKTIVNOGO ILA),
Khorskii Gidroliznyi Zavod (USSR).
For primary bibliographic entry see Field 5D.
W75-06344

5F. Water Treatment and Quality Alteration

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA. APPENDIX A: WATER SUPPLY.
California State Dept. of Water Resources, Sacramento.
California Dept. of Water Resources Bulletin No. 104-3, September 1970. 108 p, 32 fig, 41 tab, 20 plates, 201 ref.

Descriptors: *Water supply, *California, *Groundwater basins, *Surface waters, Geology, Hydrology, Artificial recharge, Reclaimed water, Imported water, Water quality, Future planning(Projected), Zone of saturation.
Identifiers: *Southern California, *Chino-Riverside(Calif).

The results of comprehensive geologic, hydrologic, and water quality studies of the Chino-Riverside Area, in Los Angeles, San Bernardino, and Riverside Counties of California are presented. Data on the geologic properties of the basin include the volume of groundwater in storage (about 12,000,000 acre-feet in 1960), the thickness and lithology of the aquifers, and the structural features that influence groundwater movement. Also included is information on the quantity and quality of the historical amounts of water supply, use, and disposal. Seasonal fluctuations in groundwater levels and groundwater in storage are described. The compiled information was used in the operational-economic phase of the overall investigation on meeting water demands in the area and these results will provide local agencies with information for optimum management of the area's groundwater basin. The hydrologic information includes analyses of past water use and disposal for the period 1934-35 to 1959-60 and estimates of future water supplies and water quality. Estimates of land use show that gross urban and suburban water service areas ranged (in acres) from 27,000 in 1932 to 121,800 in 1963; water services to gross irrigated agriculture from 113,900 in 1932 to 87,100 in 1963; and nonwater services areas from 136,200 in 1932 to 68,200 in 1963. (Auen-Wisconsin)
W75-05867

REVERSE OSMOSIS WATER PURIFYING SYSTEM FOR HOUSEHOLD USE,
S. Manjikian.
U.S. Patent No. 3,849,305, 4 p, 1 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1222, November 19, 1974.

Descriptors: *Patents, *Reverse osmosis, *Water purification, *Water quality control, Equipment, Separation techniques, Membranes, Semipermeable membrane, Desalination, Pressure, *Water treatment.

A water purifying system employs a reverse osmosis purifying unit in which a porous, semipermeable membrane-covered support, or preferably a frame carrying a plurality of membrane elements having semipermeable membrane outer surfaces, is rotated within a pressure resistant container. Water under pressure is introduced into the purifying unit and water more concentrated in salts originally present is released from the purifying unit by an automatically actuated on-off valve. Purified water produced by the purifying unit is delivered to an unpressurized water storage tank so that no back pressure can be applied to the membrane from its product water side. Purified water is dispensed from the water storage tank by a submerged pump and a valve. Water is maintained not above a predetermined level in the water storage tank by a float actuating a release valve. (Sinha-OEIS)
W75-05891

PROCESS AND APPARATUS FOR REMOVING IMPURITIES FROM CONDENSATE WATER,
Permutit Co., Paramus, N.J. (assignee)
For primary bibliographic entry see Field 5D.
W75-05892

WATER DISTILLATION APPARATUS,
Oral Corp., Boca Raton, Fla. (assignee)
R. C. Ruckstuhl.
U.S. Patent No. 3,849,260, 3 p, 2 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1209, November 19, 1974.

Descriptors: *Patents, *Distillation, *Water treatment, *Condensation, *Water quality control, *Water vapor, Equipment, Separation techniques.

A water distillation apparatus is disclosed which has a boiling chamber which receives water at the bottom from a constant level device having an overflow tube. A drain opening in the overflow tube automatically drains the boiling chamber after each use. A condenser, connected to receive water vapor from the boiling chamber, has a spiral tube inside which passes the water that is to be distilled into the inlet of the constant level device, and the water in this tube produces a cooling effect on the water vapor output from the boiling chamber. (Sinha-OEIS)
W75-05893

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
For primary bibliographic entry see Field 8C.
W75-05909

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
For primary bibliographic entry see Field 5D.
W75-05943

AUTOMATION OF THE CONTINUOUS COAGULATION MONITOR,
Arkansas Univ., Fayetteville. Dept. of Civil Engineering.
D. Mitchell, and J. J. Oskowis.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 815, $3.75 in paper copy, $2.25 in microfiche. University of Arkansas Water Resources Research Center, Fayetteville, Publication No 20, December 1974. 30 p, 10 fig, 10 ref. OWRT A-016-ARK(2).

Descriptors: Chemical precipitation, *Coagulation, *Water treatment, Water conditioning, Turbidity, *Automation, *Instrumentation, *Chemcontrol, Monitoring, *Control systems, *Waste water treatment.
Identifiers: *Chemical treatment.

The development of a fully automated continuous coagulation monitor is reported. The automated monitor has demonstrated the ability to automatically control the chemical coagulation process in both drinking water and wastewater treatment. Logic circuitry has been developed such that the automatic control system provided continuous, cyclic sampling of the effluents of the six separate flow channels of the monitor through a continuous flow turbidimeter. Control instrumentation has been developed to provide continuous indication of the chemical treatment producing the lowest turbidity. All circuitry and instrumentation designs are included.
W75-06074

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06200

ADDING FLUORIDES TO THE DIET,
Center for Science in the Public Interest, Washington, D.C.
For primary bibliographic entry see Field 5C.
W75-06318

PROCESS FOR ELECTRICAL COALESCING OF WATER,
Combustion Engineering, Inc., New York. (assignee)
For primary bibliographic entry see Field 5G.
W75-06339

5G. Water Quality Control

INTERSTATE PLANNING FOR REGIONAL WATER SUPPLY AND POLLUTION CONTROL.
Delaware River Basin Commission, Trenton, N.J.
For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, Price $3.00. EPA Water Pollution Control Research Series 16110 FPP, November 1971. 374 p, 8 fig, 92 tab. FWPCA WPD-136-01-66.

Descriptors: *Delaware River Basin, *Comprehensive planning, *Governmental interrelations, *Interstate rivers, *Cost analysis, Sewage districts, River basin commissions, River basin development, Potential water supply, Land use, Waste disposal, Future planning(Projected), Alternative planning, Water quality, Solid wastes, Wastewater disposal.
Identifiers: *Tocks Island Region, *Population growth effects, *Least-cost analyses.

In response to rapid economic and recreation development of the Tocks Island Region of the Delaware River Basin and its consequent population growth, recommendations for resources management on an interstate regional basis were developed. The Tocks Island region portion of the Delaware River includes local, state, interstate, and natural interests, and all of these levels have responsibilities in the conservation, utilization, development, management, and control of the water and related land resources. Population and related water supply requirements, wastewater volumes, and solid-waste loads for the study area were projected. The advantages and disadvantages of various alternative master plans for water supply and waste disposal in the area are discussed, and the reasoning for the selection of

the proposed plans is included. Least-cost analyses of the alternatives within the prescribed quality constraint were reviewed before recommendations were developed. Recommendations include the designation of the Delaware River Basin Commission as the central administration agency of waste disposal for the TIRES area, with six subregional systems. Detailed studies to investigate alternative solid waste disposal methods and ground and surface water potentials in meeting the projected increased demands are needed before the recommendations can be further refined. (Becker-Wisconsin)
W75-05860

STUDY OF SINGLE-RESPONSIBILITY CONCEPTS FOR WATER POLLUTION CONTROL PROJECTS.
Bechtel Corp., San Francisco, Calif.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 056, $5.75 in paper copy, $2.25 in microfiche. Environmental Protection Agency, Washington, D.C. Municipal Wastewater Systems Div., Final Report 10293-001, April 1974. 134 p, 7 fig, 3 tab. EPA 68-01-0073.

Descriptors: *Projects, *Contracts, *Construction, *Performance, *Facilities, Contract administration, Design, Institutional constraints, Management, Operations, Protection, Scheduling, Waste water treatment.
Identifiers: *Single-responsibility contractors.

Four basic organizational forms of performing public works projects involving variations of arrangement, contract terms, payment provisions, obligations, and interrelationships between the parties involved in major capital projects are discussed. The 'Engineering and Construct (EPC)' form evaluated provides good overall project performance and other benefits. It makes it difficult for the owner to exercise control over the project, however the contractor is in a position to assume a significant contractual responsibility. If maximizing the contractor's responsibility to furnish guarantees and provide for financial recovery were the owner's only consideration, the EPC contract would always be the one of choice. In actual practice, however, a compromise has to be struck between contract responsibility and owner control. The tradeoff is therefore between a contractual form in which the owner's interest is well represented, but which does not provide firm guarantee provisions, versus an EPC or similar form, in which the contractor has total financial responsibility, but in which the owner relinquishes a portion of control. Given the relaxation of existing external factors inhibiting change, the form best suited to any given project will vary with project size, complexity of technical or managerial aspects, competency of the owner's staff, availability of single-responsibility contractors and of a complete performance criteria package. (Auen-Wisconsin)
W75-05868

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CEMENT INDUSTRY,
Southern Research Inst., Birmingham, Ala. Economic Research and Planning Section.
S. Schaffer, and P. Tropper.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-234 442, $4.25 in paper copy, $2.25 in microfiche. Report EPA-230/2-74-004, April 1974. 69 p, 5 fig, 16 tab, 16 ref. EPA P4-01-03377.

Descriptors: *Cements, *Economic impact, *Costs, *Pollution abatement, Industrial wastes, Standards, Investment, Operating costs.
Identifiers: *Cement industry.

The economic impact of pollution controls on the cement industry was based on the estimated costs of controls at the 120 cement plants investigated, with estimated profitability and cash flow per average plant in 1972. The total cost of achieving essentially pollutant-free discharges is considered to be approximately $19 million for capital investment by 1977 and an additional $4 million by 1983. Total annual operating costs for pollution controls are estimated at about $6 million by 1977 and an additional $1 million by 1983. All but four of the companies could meet the costs of pollution controls in all of their plants without difficulty, often from internal funds generated just in 1972. The cost of installing pollution control equipment might justify price increases of from 1% to 3% per ton in polluting plants. There are, however, almost as many non-polluting plants in the cement industry as plants that discharge pollutants. Competitive pressures from non-polluting plants selling in approximately the same market areas may serve to restrain plants from recovering pollution control costs through price increases. Plant closings and resulting unemployment in affected areas, are more likely to result from a decrease in cement consumption than from pollution control requirements. (Auen-Wisconsin)
W75-05869

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES. THE ELECTROPLATING INDUSTRY, COPPER, NICKEL, CHROMIUM AND ZINC.
Kearney (A. T.) and Co., Inc., Chicago, Ill.
For primary bibliographic entry see Field 6B.
W75-05873

FILTER SYSTEMS,
Sutcliffe, Speakman and Co. Ltd., Leigh (England); and Pond (Alan) Equipment Ltd., Harlow (England). (assignees)
For primary bibliographic entry see Field 5D.
W75-05880

SYSTEM FOR REMOVING FLOATING OIL FROM WATER,
Amoco Production Company, Tulsa, Okla. (assignee)
L. W. Jones.
U.S. Patent No. 3,850,807, 3 p, 4 fig, 7 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1702, November 26, 1974.

Descriptors: *Patents, *Pollution abatement, *Water quality control, Equipment, Separation techniques, *Oil spills, *Oil pollution, Barriers, Rivers, Streams.
Identifiers: *Pollution prevention, Sulfur beds.

A combination oil accumulator-separator is floated on the stream containing the oil slick or sheen. It is preferably tied in the middle of the stream to both banks by floating vertical barriers. The stream current carries the floating oil plus some water off the top of the stream guided by the vertical barriers into the throat of the oil accumulator-separator. The separator contains a bed of granular sulfur supported by a perforated plate. The supporting plate has non-perforated corrugations or protected channels. The oily water flows through the sulfur bed where the oil is coalesced and concentrated. As the water and coalesced oil flows out the lower perforations, the oil seeks the protection of the channels. The channels are tilted upward in a downstream direction toward a collecting conduit which is connected to a pump. The coalesced oil is removed by the pump and the oil-free water flows downward and out the perforations of the plate and again becomes a part of the main flow of the stream. (Sinha-OEIS)
W75-05881

INFLATABLE BARRIER FOR SUBSTANCES FLOATING ON WATER,
P. Preus.
U.S. Patent No. 3,849,989, 3 p, 4 fig, 8 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1447, November 26, 1974.

Descriptors: *Patents, *Water quality control, *Oil spills, *Oil pollution, *Pollution abatement, Barriers, Equipment.
Identifiers: *Pollution prevention.

The inflatable barrier includes floatation chambers which are fabricated from a tough, puncture resistent material. It is provided with independent subchambers, each capable of supporting the barrier in the event of loss of pressure in the neighboring subchamber. A liquid impervious flexible skirt depending from the chambers provides a barrier below the waterline. Boom segments are fabricated so that a fin is formed along the upper surface of the floatation chamber. The fin functions as a spoiler to 'kill' aerodynamic lift. It functions to trip the flow over the surface to provide non-lifting turbulent flow. (Sinha-OEIS)
W75-05886

APPARATUS FOR SKIMMING FLOATING POLLUTION FROM A LIQUID SURFACE,
H. Westerman.
U.S. Patent No. 3,849,308, 3 p, 3 fig, 3 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1223, November 19, 1974.

Descriptors: *Patents, *Skimming, *Oil spills, *Oil pollution, *Pollution abatement, *Water quality control, *Water pollution control, Equipment, Separation techniques.
Identifiers: *Pollution prevention.

A floating container has a closed bottom and an open shallow end and a deep end. An interior float is fixed in the open shallow end. A suction pipe line is fixed midway between both ends. The suction end reaches near the bottom to discharge the liquid contents. The interior float is weighted to submerge the open shallow end and raise the deep end when the liquid content has been reduced by discharge from the suction pipe line to approaching its suction end. The interior float is buoyant, so that the ends may change position when the contents are increased and raised by the submergence to approach overflowing the container. The raising and lowering of the opposite ends is automatic and causes a back and forth flow of the contents to dissolve soluble solids and prevent insoluble solids from entering the suction end or to slow the discharge from the container. The frequency of the rocking motion is self regulating. (Sinha-OEIS)
W75-05888

DEVICE FOR REMOVING OIL AND THE LIKE FROM WATER CONTAMINATED BY OIL OR THE LIKE,
International Pollution Control Systems, Inc., Washington, D.C. (assignee)
P. Jakubek.
U.S. Patent No. 3,849,311, 4 p, 4 fig, 6 ref; Official Gazette of the United States Patent Office, Vol 928, No 3, p 1224, November 19, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, *Water pollution control, *Water quality control, Separation techniques, Skimming.
Identifiers: *Pollution prevention.

To remove oil or the like from a water surface, the ship carries a bilge pump controlled by a float switch. An air separator and oil separator are provided. Contaminated water is pumped via the air separator through the oil separator. The oil separator includes at least one collecting tank for the removed oil. At least one coarse and one fine separator or foam are arranged. The coarse separator is connected with the collecting tank which includes a shutoff member. An insert provided within the coarse separator separates an inlet from an outlet, as well as has at least one flow channel extending obliquely upward, seen in the direction of flow. (Sinha-OEIS)
W75-05889

APPARATUS FOR AVOIDING WATER POLLUTION AT AN OFFSHORE DRILLING SITE,
Texaco, Inc., New York. (assignee)
L. P. Teague.
U.S. Patent No. 3,860,019, 4 p, 1 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 694, January 14, 1975.

Descriptors: *Patents, *Pollution abatement, Water pollution, *Oil wastes, *Oil pollution, *Drilling fluids, Water quality control, Screens, Detergents, Oily water, Mud.
Identifiers: *Offshore drilling, Drilling cuttings, Drilling mud.

An apparatus is disclosed which treats well drilling cuttings that normally accrue from the boring of a subterranean oil or gas well. Ancillary to a well drilling operation, drilling cuttings are sequentially carried, together with drilling mud, through a first shaker. This device comprises in essence a screen separator of such a mesh that a major component of the fluid mud will pass through the screen. The more solid drilling cuttings remain on, and are carried to the screen discharge. The mud free cuttings are then passed through a cleaning cycle where they are washed by contact with a liquid detergent. The cuttings, together with used detergent, are again separated at a second shaker. The detergent passes through the shaker screen and is recycled for subsequent reuse. The oil free cuttings are discharged from the shaker to a collector where they are subjected to a final bath comprising relatively clean water, which can be sea water. The clean, and detergent free cuttings are then deposited beneath the water's surface where they gravitate to the ocean floor. (Sinha-OEIS)
W75-05900

SCOOP FOR COLLECTING A LAYER OF POLLUTING MATERIAL ON WATER SURFACES,
L. Chastan-Bagnis.
U.S. Patent No. 3,847,815, 2 p, 2 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 745, November 12, 1974.

Descriptors: *Patents, *Oil pollution, *Oil spills, *Pollution abatement, Water quality control, Flotsam, Equipment, *Separation techniques.
Identifiers: *Scoops.

A device for collecting hydrocarbons, granular materials, absorbing bodies and various polluting agents which float as a layer on the surface of water such as seas, lakes, rivers, harbors, estuaries, pools, etc. is disclosed. The device operates by producing a sufficiently thick layer of polluting material so that it can be collected. It comprises a scoop having substantially the shape of a circular sector and a header with diffusing tubes circulating water under pressure towards the rear of the scoop where it is allowed to escape through a suitable opening. The thickened layer of polluted material which floats on top of water is removed through a separate duct. (Sinha-OEIS)
W75-05903

OIL SLICK SKIMMER,
D. J. Weatherford.
U.S. Patent No. 3,860,519, 5 p, 7 fig, 9 ref; Official Gazette of the United States Patent Office, Vol 930, No 2, p 847, January 14, 1975.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Pollution abatement, Water pollution control, Boats, Barges, *Skimming, Filtration, Equipment, *Separation techniques.

A maneuverable boat or barge employs an appended hull to gather and skim from the surface of the water, oil slicks along with a minimal amount of surface water into a compartment in the craft isolated from its main deck. This oil-water mixture is then pumped through a flexible hose to a storage compartment in a barge where the oil rises to the top of the water in seconds. Surface oil is then bled off the top and pumped into oil accumulation compartments. Each of these compartments, when filled, is pumped into a tanker for continuous removal and reclaiming. The water in the barge is also pumped through a water filter before returning to the sea. The boat functions effectively when floating in an oil slick by the effects of gravity drawing the oil slick into its hull as well as when it is moving and the oil slick is forced by the forward movement of the water into the boat. (Sinha-OEIS)
W75-05905

APPARATUS FOR SEPARATING OIL FROM WATER AND MEASURING THE AMOUNT OF OIL SO SEPARATED,
A. C. Tulumello.
U.S. Patent No. 3,847,810, 5 p, 8 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 743, November 12, 1974.

Descriptors: *Patents, *Oil spills, *Oil pollution, *Water purification, *Water quality control, *Pollution abatement, *Water pollution control, Separation techniques.
Identifiers: *Pollution prevention, Capacitance measurement.

The apparatus for separating trace amounts of oil from water and measuring the amount of oil in the water comprises a rotor including an absorber material which selectively absorbs oil. The rotor is mounted on a drive shaft of a motor and is contained in a housing. There is an inlet in the housing for introducing an oil and water mixture, and an outlet near the periphery of the rotor for removing separated water. The drive shaft is turned by a motor to thus establish in the housing a centrifugal force-field. This field separates the oil from the water pulling the oil to the center of the rotor and pushing separated water to the periphery of the rotor and out the outlet. The preferred absorber material is polyurethane foam. The oil can be removed by introducing air into the rotor. The rotor also includes a pair of spaced plates secured to the drive shaft with the absorber material between them. These plates are conductive, electrically isolated from each other, and connected in a capacitance measuring circuit. The plates and absorber material are a variable capacitor whose capacitance changes as a function of oil collected by the absorber material. This capacitance is a measure of oil in water. (Sinha-OEIS)
W75-05910

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
G. P. Williams.
In: Research and Applied Technology Symposium on Mined-Land Reclamation. March 7-8, 1973, Bituminous Coal Research Inc., Monroeville, Pennsylvania, p 243-249, (1973). 2 fig, 1 tab, 3 ref.

Descriptors: *Strip mines, *Slope stabilization, *Soil mechanics, *Soil physical properties, Mining engineering, Appalachian Mountain region, Water pollution control, *Kentucky.

In steep terrain, deposits of surface mine waste often are unstable, as evidenced by spoil slides. In 1966, the state of Kentucky implemented regulations specifying the shape and dimension of mine spoil dumps. Increased storage of spoil on the bench accounted for a 42% reduction in area disturbed by slides and a 17% reduction in total areal disturbance. The overall level of instability on spoil dump outslopes is still excessive, but this instability can be reduced as knowledge of the physical and mechanical properties of spoils and of site characteristics is accumulated and incorporated into mining and spoil placement techniques. (Forest Service)
W75-05921

SURFACE SLICKS AND FILMS - A NEED FOR CONTROL,
Pacific Northwest Environmental Research Lab., Corvallis, Oreg.
For primary bibliographic entry see Field 5A.
W75-06023

ROCK TUNNELS RECENTLY COMPLETED IN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
For primary bibliographic entry see Field 8H.
W75-06061

SALT BRINE RUNOFF CONTROL AT STOCKPILE SITES,
Minnesota Dept. of Highways, St. Paul. Maintenance Standards Section.
R. A. Pletan.
Office of Engineering Standards, Research and Standards Division, Minnesota Highway Department, St. Paul, November 1, 1972. 18 p.

Descriptors: *Chemcontrol, *Water pollution control, *Saline water-fresh-water interfaces, *Aesthetics, Highway effects, *Sodium chloride, Highways, Minnesota, Surface runoff, Chemical industry, Storage requirements, Sodium compounds, Ice-brine systems, Highway beautification, Roads, Water pollution sources, Brines.
Identifiers: *Salt stockpiles, *Road salt, *Ice control materials, Eutectic.

The pollution problems from salt brine runoff at bulk salt and treated sand stockpile sites has always been a concern to the Minnesota Highway Department. In order to alleviate these concerns, three objectives were established: (1) analyze the extent of salt brine runoff from salt and treated sand stockpiles; (2) study and evaluate possible solutions; and (3) recommendations where visual or chemical pollution problems exist or are anticipated. Basically, all of the 260 sites on which chemicals are stored contribute to visual pollution and as such are subject to public criticism. While visual pollution is an indicator of chemical pollution, it is concluded that efforts to abate the unsightliness of stockpile sites will in most cases also curtail or eliminate any detrimental chemical effect the salt brine from stockpiles will have on the life and health of plants, wildlife, and man. Once the brine is allowed to form, the only way to completely control it is to confine and collect the contaminated solution and dispose of it either by evaporation or hauling it away to an approved disposal site. Due to the chemical characteristics of salt in solution, it will not settle or filter out at some of the current control facilities. (Poertner)
W75-06062

ANALYSIS AND DESIGN OF SETTLING BASINS FOR IRRIGATION RETURN FLOW,
Idaho Univ., Moscow.
F. J. Watts, C. E. Brockway, and A. E. Oliver.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 814, $4.75 in paper copy, $2.25 in microfiche. Idaho Water Resources Research Institute, Moscow, Completion Report, September 1974. 74 p, 9 fig, 11 tab, 1 ref, append. OWRT A-042-IDA(1).

Descriptors: Sediments, *Sediment yield, *Settling basins, Irrigation, *Return flow, Erosion, *Design, Loam, Soils, Beans, Sugar beets, Corn(Field), Computer programs, Simulation analysis.

Equations for sediment yield from sandy loam and loamy soil were obtained from four furrow irrigated fields. Sediment yields from bean, sugar beet and corn field ranged from 0.1 to 13.5 tons per acre with a representative yield of 1.2 tons per acre. Temperature and point velocity measurements were obtained in a 500 foot long by 60 foot wide by 5 foot deep settling basin. Concentration

of sediment in the inflow to the basin varied from 30 to 400 mg/l and the overall trap efficiency based on average discharge and average concentrations was about 65 percent. A computer program for simulating the performance of a settling basin was developed. Data input consists of basin dimensions, inflow, concentration and gradation of sediment and time and spacial increments used for control. The depth of sediment, efficiency, weight of settled sediment and volumetric amount of sediment is printed out for specified cross sections along the centerline of the basin and for the total basin.
W75-06078

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06082

WATER MANAGEMENT IN LIVESTOCK WASTE HANDLING SYSTEMS,
Clemson Univ., S.C. Dept. of Agricultural Engineering.
For primary bibliographic entry see Field 5D.
W75-06087

AN EVALUATION OF THE EFFECTIVENESS AND APPLICABILITY OF PHYSICAL-CHEMICAL TREATMENT OF URBAN LAND RUNOFF,
North Carolina State Univ., Raleigh. Dept. of Civil Engineering.
For primary bibliographic entry see Field 5D.
W75-06094

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
For primary bibliographic entry see Field 5D.
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
For primary bibliographic entry see Field 5D.
W75-06097

A SOCIOLOGICAL APPROACH TO THE PROBLEM OF WATER POLLUTION,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Rural Sociology.
P. H. Gore, S. Wilson, and H. R. Capener.
Growth and Change, A Journal of Regional Development, Vol 6, No 1, p 17-22, January 1975. 4 fig, 1 tab.

Descriptors: *Water pollution, *Water pollution control, *Psychological aspects, *Attitudes, Management, Watershed management, Water policy, Public access, *New York.
Identifiers: Cornell University(N.Y.), Fall Creek(N.Y.), Canadarago Lake(N.Y.).

Dimensions of public concern for environmental quality and its origins were explored in research which probed public attitudes by means of a questionnaire designed to gather information about respondents' water use practices and their attitude and knowledge about various water pollution problems, methods of control and water quality standards. The study area included the watersheds of Fall Creek, which has a watershed area of 395 square kilometers, and is a tributary of Cayuga Lake, and Canadarago Lake, a highly eutrophic lake in east central New York having a watershed of 197 square kilometers. The population sample of 623 was remarkably stable: 62% had lived there five years or more; 87% owned their homes. A proximity measurement (closeness to lake) yielded no significant differences which strengthens rationale for treating the watershed as the unit for management purposes. Awareness of water pollution and need for stringent controls were both majority attitudes. Results supported a continued involvement for state and regional governments in land use planning, control regulations and enforcement and funding for pollution control techniques. All available pollution control techniques should be applied even considering the cost according to 73% of the sample. Improved environmental quality depends upon proving the case for a pollution problem by adequate information, lowering the public's perception of the cost of abatement and building the case that this is an appropriate arena for government leadership. (Salzman-North Carolina)
W75-06099

STATE OF OHIO V. REPUBLIC STEEL CORP (ACTION FOR POLLUTION OF WATERS WITHOUT A VALID PERMIT).
For primary bibliographic entry see Field 6E.
W75-06142

LLOYD HARBOR STUDY GROUP, INC. V. DIAMOND (ACTION CHALLENGING DETERMINATION THAT WATER QUALITY STANDARDS WOULD NOT BE CONTRAVENED BY CONSTRUCTION OF NUCLEAR POWER PLANT).
For primary bibliographic entry see Field 6E.
W75-06143

ARMSTRONG CHEMCON, INC. V. POLLUTION CONTROL BOARD (APPEAL OF BOARD'S ACTION LIMITING DISCHARGES OF MERCURY INTO WATERS).
For primary bibliographic entry see Field 6E.
W75-06144

LOWER ST. LOUIS RIVER BASIN--SANITARY SEWERS (AS AMENDED).
For primary bibliographic entry see Field 6E.
W75-06146

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
For primary bibliographic entry see Field 6E.
W75-06151

THE STATE OF TEXAS, ET AL. V. FRI (CHALLENGE OF EXECUTIVE IMPOUNDMENT OF FWPCA FUNDS),
1 Pollution Control Guide, Vol. 3, paragraph 15029, p. 15248-15252, 1974.

Descriptors: *Judicial decisions, *Government finance, *Budget, *Administrative agencies, *Administrative decisions, Adoption of practices, Economic aspects, Water law, Water pollution control, Federal Water Pollution Control Act, Construction, Treatment facilities, Federal government, *Texas, planning, Local governments, State governments, Administrative decisions.
Identifiers: Immunity(Legal aspects), Sovereign immunity.

This federal district court case in Texas held that the Administrator of the Environmental Protection Agency is required to allot all appropriations authorized by Congress. This decision will make money available for contract obligation on sewage treatment works construction projects approved by the Administrator for federal funding. The language of the Federal Water Pollution Control Act and its legislative history show that the Administrator was intended to have some discretion over the rate of spending. However, Congress also showed its intent to marshall the requisite federal funds to achieve the water quality goals in the Act. Consequently the Administrator has a mandatory duty to allot the full sums authorized for contract obligation. The State of Texas has requested money in excess of its reducted allotment. Impoundment of funds imparis the long-range planning ability of the state and local governments. Sovereign immunity as a defense is inapplicable in a suit requesting relief which directs the Administor to perform a non-discretionary statutory act. (Sperling-Florida)
W75-06152

STATE V. REED (ACTION BY STATE TO PREVENT CONSTRUCTION OF DRIVE-WAY THRU WETLANDS, A VIOLATION OF STATUTE),
For primary bibliographic entry see Field 6E.
W75-06155

LICENSES--MOTOR VEHICLE--SUSPENSION FOR DUMPING,
For primary bibliographic entry see Field 6E.
W75-06156

STATE OF VERMONT V. STATE OF NEW YORK (ACTION TO ABATE POLLUTION OF INTERSTATE WATERS--CONSENTDECREE),
For primary bibliographic entry see Field 6E.
W75-06157

KIRKLAND V. HARDWICKE CHEMICAL CO. (ACTION FOR POLLUTION OF STREAM),
For primary bibliographic entry see Field 6E.
W75-06158

PUBLIC WROKS--COUNTIES--EROSION CONTROL (AS AMENDED),
For primary bibliographic entry see Field 6E.
W75-06160

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
For primary bibliographic entry see Field 6E.
W75-06165

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-MI-74-0041-F, $3.75 in paper copy, $2.25 in microfiche. January 1974. 149 p, 13 fig, 2 tab.

Descriptors: *Environmental effects, *Sludge disposal, *Landfills, *Michigan, *Water pollution control, Great Lakes, Lake Michigan, Dredging,

Spoilbanks, Disposal, Federal government, Local governments, Governmental interrelations, Harbors, Inland waterways, Navigation, Rivers and Harbors Act, Waste disposal, Water pollution, Water pollution sources, Water quality control.
Identifiers: *Environmental Impact Statements, Grand Haven(Mich), National Environmental Policy Act.

Maintenance dredging of Grand Haven Harbor, Michigan produces approximately 50,000 cubic yards of polluted dredge material annually. In the past this has been disposed of in the open waters of Lake Michigan. The proposed action calls for disposing of this material in a contained area adjacent to the harbor, thereby reducing the adverse environmental impact of the dredging activities. This project would render a partial pollution abatement function for 10 years, after which time pollutants presently reaching lake waters are expected to be controlled at their sources. The proposed sites, a 36-acre tract on Harbor Island which is currently used as a sanitary land fill area by the City of Grand Haven, and a 15-acre area of privately-owned land, will be converted from semimarsh condition to total terrestial environment. The proposed sites are of no environmental or economic significance and represent a change in the choice of alternatives from the site indicated in the draft statement. The change was made in response to strong environmental opposition to the original site proposal. The present proposal is considered the least damaging compared to other alternatives. (Deckert-Florida)
W75-06174

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-NY-73-1351-F, $3.75 in paper copy, $2.25 in microfiche. August 15, 1973. 44 p, 5 tab, 2 map.

Descriptors: *New York, *Environmental effects, *Channel improvement, *Harbors, *Dredging, Rivers and Harbors Act, Excavation, Federal government, Siltation, Aquatic environment, Turbidity, Water pollution effects, Spoil banks, Navigation, Benthos, Bottom sediments, Coastal engineering, Economic impact, Inudstries, Environment, Recreational facilities, Administrative agencies, Transportation, Alternatives, Cost-benefit analysis, Oceans.
Identifiers: *Environmental Impact Statements, National Environmental Policy Act, Navigation obstructions, Coastal zone, Coastal zone management, Port Chester Harbor, Byram Channel, New York.

The proposed project consists of maintenance dredging of the Port Chester Harbor and Byram river channels to authorized dimensions, and the dumping of excavated material at the approved site in the New York Bight. The project, located on the New York-Connecticut boundary, is vital to the economic health and industrial activity of the surrounding area. Environmental impacts include excavation of 60,000 cubic yards of bottom materials and enhanced economy of commodity transportation. Adverse effects consist of temporary interference in marine activity, temporary increase in turbidity and siltation, temporary loss of bottom life and spoilage disposal at an already degraded approved dumping area in the New York Bight. Alternatives to enlargement of the channel are continued use of the present channel or the use of other modes of commodity transportation. None of the alternatives to ocean dumping are as feasible as the proposed action. The temporary disturbance to aquatic life is outweighed by the long-term benefits to riverfront industry. Harbor and materials are the only irretrievable resource commitments as the removal of toxic bottom material may stimulate aquatic life. Comments were received from federal, state and local agencies. (Dillingham-Florida)
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-NY-73-1350-F, $3.75 in paper copy, $2.25 in microfiche. August, 15, 1973. 38 p, 1 tab, 1 fig.

Descriptors: *New York, *Environmental effects, *Dredging, *Channel improvement, *Harbors, Rivers and Harbors Act, Excavation, Federal government, Siltation, Turbidity, Aquatic environment, Water pollution effects, Spoil banks, Navigation, Coastal engineering, Bottom sediments, Aquatic soils, Benthos, Economic impact, Industries, Recreation, Administrative agencies, Environment, Adoption of practices, Conservation, Cost-benefit analysis, Oceans.
Identifiers: *Environmental Impact Statements, Mamaroneck Village(NY), National Environmental Policy Act, Navigation obstructions, Coastal zone, Ocean dumping.

The action proposed consists of maintenance dredging of the existing federal channel in Mamaroneck Harbor, New York to its authorized project dimensions and spoil disposal in the approved dumping grounds of the New York Bight. This would permit safer and more efficient use of the harbor by the petroleum industry and the boaters which are important to the economy of Mamaroneck Village. The adverse effects include the removal of bottom life associated with sediments to be dredged, siltation and turbidity caused by dredging, and disposal of the spoilage at an already degraded dumping site. The alternative of no action would result in the gradual elimination of the harbor's use for recreational and commercial boats because of steady siltation. Alternate methods of dredging aren't feasible. Other spoil disposal methods are costly and environmentally hazardous. Dredging may benefit the harbor area but will further degrade the dumping area. The Harbor bottom, its marine life and funds will be irretrievably committed. Comments were received by eight government departments. (Dillingham-Florida)
W75-06177

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 6B.
W75-06193

PESTICIDE PYROLYSIS DEVICE,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
H. H. Rosen.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-784 553, $3.25 in paper copy, $2.25 in microfiche. Technical Report No. 74-89, June 1974. 19 p, 5 fig, 3 tab, 2 append.

Descriptors: Pesticides, *Incineration, *Environmental sanitation, *Burning, *Pesticide residues, DDD, DDT, Chemical wastes, Chemicals, Analysis, Instrumentation, Oxygen, Nitrogen, Opacity, Carbon dioxide, Organic compounds, Pumps, Refractivity, *Waste disposal.
Identifiers: *Pesticide pyrolysis, *DDT destruction, Kerosene, Oil burner, Pipe fittings, Sheet metal, Furnace, Carbon monoxide.

A system for destroying small stocks of DDT-kerosene solutions in situ was developed. The system was designed to be fabricated by Post Engineers from commonly available materials, i.e., an oil burner, pipe fittings, sheet metal, a water pump, and refractory material for lining the 55-gal drum used as a furnace. The system is capable of burning about 5 gallons of DDT solution per hour. Tests of the effluent from a prototype system by the Army Environmental Hygiene Agency showed that the emissions were below the prescribed safe limits. (Henley-ISWS)
W75-06227

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
E. Greer.
Environmental Affairs, Vol 3, No 2, p 199-220, 1974, 117 ref.

Descriptors: *Water pollution control, *Legal aspects, *Indiana, *Industrial wastes, *Steel, *Political aspects, Lake Michigan, Rivers, Iron, Effluents, Cyanide, Nitrogen, Toxicity, Aquatic life, Algae, Federal government, Federal jurisdiction, Federal Water Pollution, Control Act, State jurisdiction, Political constraints.

Damage to the Lake Michigan ecosystem from the United States Steel Corporation plants at Gary, Indiana, has resulted from discharges of oil, iron particles and other solid particulates. In theory, the City of Gary, the State of Indiana and the federal government can require a cessation of the dumping, but none have done so. The City of Gary was inactive in this area because the Mayor did not control the Board of health nor have a majority on the City Council. Administration aides assigned low priority to water pollution because of lake of knowledge and because most pollutants are dispersed in a northwesterly direction away from Gary, and local political pressure was concentrated on the more obvious problem of air pollution. The State of Indiana is seen to have a relatively weak water pollution statute and unusual solicitude for giant corporations. Actions of the Stream Pollution Control Board are summarized. The federal givernment constricted enforcement of the 1899 Rivers and Harbors Act by prosecuting only exceptional discharges rather than pollution of a continuing nature. Administrative complexity in the 1972 Amendments to the Water Pollution Control Act has led to procedural delays. U.S. Steel has promoted plans which call for the general public to assume a large part of the cost of pollution control equipment. (Eagle-Vanderbilt)
W75-06322

MORE LIFE FOR DIAPHRAGM CELLS.
Chemical Week, Vol 113, No 18, p 32, October, 1973-1 photo.

Descriptors: *Industrial wastes, *Chlorine, *Research and development, *Pollution abatement, Mercury, Toxicity, Anodes, Electrodes, Membranes, Organic compounds.
Identifiers: Nafion.

The new cells that have gone into chlorine plants were coated metal anodes instead of graphite. This enables chlorine producesrs to boost amperage and obtain a similar increase in output. Metal anodes permit the use of lower voltages and enable operators to increase amperage without generating excessive heat. This means that cell size does not have to be increased. PPG Industries introduced a

new cell of bipolar design that operates at lower (72,000) amps. Diamond Shamrock and other companies have been working on new membrane materials that promise to increase significantly the life of the diaphragm in the cell. DuPont introduced the first new membrane, which is being used in commercial development work. The material, called Nafion, is made from perfluorosulfonic acid and has greater strength characteristics than asbestos. Use of diaphragm cells eliminates the need for dangerous mercury cells in chlorine production. (Jernigan-Vanderbilt)
W75-06324

PROCESS FOR ELECTRICAL COALESCING OF WATER,
Combustion Engineering, Inc., New York. (assignee)
F. L. Prestridge.
U.S. Patent No. 3,847,775, 7 p, 5 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 733, November 12, 1974.

Descriptors: *Patents, *Coalescence, Oil wells, Oily water, Drops(Fluids), Emulsions, Gravity, Secondary recovery(Oil), Separation techniques.
Identifiers: *Water droplets, Electrical system, *Electrostatic fields.

A process for coalescing water which is dispersed in the form of droplets throughout a second liquid includes: passing a mixture of a liquid and water droplets dispersed throughout the liquid through an electrostatic field; generating the electrostatic field with two sources of D.C. voltages, each source being periodically applied to one of two spaced electrodes; forming a body of water droplets coalesced by the electrostatic field and gravitated below the electrodes; withdrawing water from the body while maintaining a predetermined level for the body below the electrodes; connecting the body to the reference common to the two sources; and withdrawing from the field the liquid from which the water droplets are gravitated. (Sinha-OEIS)
W75-06339

WASTE OIL RECOVERY PRACTICES--STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06347

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W75-06349

6. WATER RESOURCES PLANNING

6A. Techniques Of Planning

OPTIMAL CAPACITY EXPANSION OF A SECONDARY TREATMENT SYSTEM,
General Motors Technical Center, Warren, Mich. Manufacturing Development Staff.
For primary bibliographic entry see Field 5D.
W75-05852

COORDINATION OF REGIONAL WATER RESOURCE SUPPLY AND DEMAND PLANNING MODELS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
Y. Y. Haimes, and W. S. Nainis.
Water Resources Research, Vol 10, No 6, p 1051-1059, December 1974. 6 fig, 5 tab, 37 equ, 20 ref.

Descriptors: Water resources, *Long-term planning, *Water supply, *Water demand, *Projects, *Scheduling, *Economic efficiency, Optimization, Algorithms, Cost-benefit analysis, Dynamic programming, Linear programming, Input-output analysis, Evaluation, Estimating, Methodology, Regions, Mathematical models, Systems analysis, Equations, *Coordination, *Regional analysis.
Identifiers: Capacity expansion, Cost minimization, Benefit maximization, Multilevel theory, Net benefits.

A water resources planning framework is provided in which scheduling, construction, and expansion of water resources projects are determined with economically-based objectives in mind. A long-range capacity expansion planning model is formulated that provides a projection of future water supply availabilities based on economic efficiency. A water supply model provides a least-cost schedule of development projects to meet an initial fixed demand function for project outputs. Using the initial demand function as an availability function, a demand model maximizes the value added and determines the possible outputs of various industrial sectors. A dynamic programming algorithm is used to schedule the projects and a Leontief input-output linear program is used to model the response to project supplies. Multilevel theory provides a dynamic coordination scheme that seeks the best joint solution of the scheduling problem and the input-output linear program: The initial demand functions are modified by a coordination model that utilizes the dual variables and other information from the two optimization models (supply and demand). The sequence of optimization is iterative, and the time sequence of water supplied and demand that maximizes the net benefits is found. A regional planning example from the North Atlantic Region study is given. (Bell-Cornell)
W75-05856

DEVELOPMENT OF A COMPREHENSIVE TVA WATER RESOURCE MANAGEMENT PROGRAM.
Tennessee Valley Authority, Knoxville. Div. of Water Control Planning.
Project Status Report July 1974, October 1974. 83 p, 19 fig, 2 tab, 24 ref, 10 append.

Descriptors: *Systems analysis, *Computers, *Tennessee Valley Authority, *Management, Optimization, Algorithms, Economic justification, Water resources development, Comprehensive planning, Conjunctive use, Reservoirs, Nuclear powerplants, Hydroelectric plants.
Identifiers: Out-of-kilter algorithm.

The basic underlying idea of a program initiated by TVA in 1971 is to apply operations research methodology to real world problems of the TVA system management to optimally operate the reservoir system for the specified multipurpose uses under observation of all constraints of balanced resource development and conservation. A case study of the impact assessment of the Browns Ferry Nuclear Plant uses system simulation models, with results showing which specific cooling mode is the most economic operation. Systems analysis techniques for reservoir release scheduling led to the adoption of 'dynamic programming by successive approximation' as a promising method to produce flexible multipurpose reservoir operation guidelines. An outline is given of the tentatively planned model for day-to-day multipurpose water management, the use of various models in the overall scheme, and the hardware requirements for its implementation. The initial phase indicates that by proper use of all system capabilities at least marginal improvements in operation and costs can be achieved. Preliminary results of the optimization studies indicate that by using these methods in reservoir scheduling several million dollars annually can be saved in system generation costs, while the expense for the proposed methodology development including the initial phase, is estimated to cost about $4 million over a ten-year period. (Auen-Wisconsin)
W75-05874

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2A.
W75-05934

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
For primary bibliographic entry see Field 8A.
W75-06047

FLOODWATER MANAGEMENT PLAN, NORTH BRANCH OF THE CHICAGO RIVER, LAKE AND COOK COUNTIES, ILLINOIS.
Chicago River Steering Committee, Chicago, Ill.
For primary bibliographic entry see Field 4A.
W75-06048

PLANNING INDUSTRIAL AREAS FOR BARGE PORTS,
Lockwood, Andrews and Newnam, Inc., Houston, Tex.
E. A. Brinkman, and G. F. West.
Preprint No. 1566, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 23 p, 11 fig.

Descriptors: *Planning, *Industrial plants, *Ports, *Inland waterways, *Barges, Transportation.
Identifiers: *Barge ports, Port facilities, Industrial parks.

A basic principle for planning a port oriented industrial area is that it be responsive to the economy of the area and to the function of the particular port. The port facilities in the terminal area must be adequate and deversified enough that industry will be enticed to locate in an area integrated with the function of the port. The elements that influence the function of the port include the economic base of the contributory area, industry mix, and product mix of both inbound and outbound freight. The list of products and their projected tonnages suggest the port facilities required to handle them. They are the basis for an estimate of the probable number and type of barges that will ply the port. Then, facilities can be planned for this traffic. General requirements for industries surrounding the port include access to roads, railroads, utilities, reasonable cost of land, construction, operation, protection from flooding, adequate provision for waste treatment, and community acceptance. These requirements form the guidelines to be followed in the planning phase. Proper site selection, provisions for future expansion, and flexibility of layout are also crucial factors to insure the final development of the industrial area. (Poertner)
W75-06052

KETCHIKAN WATERFRONT DEVELOPMENT,
Tippetts-Abbett-McCarthy-Stratton, Seattle, Wash.
R. V. Kycek, and P. Semrod.
Preprint No. 1554, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 9 p, 2 fig.

Descriptors: *Water resources planning, *Comprehensive planning, *Project planning, *Future planning, *Social aspects, *Decision making, Social values, Regional development, Alaska.
Identifiers: *Waterfront development, *Ketchikan(Alaska), Public participation, Implementative planning.

The key elements which can appear in implementive planning include: (1) a crisis factor, (2) an existing comprehensive plan, and (3) a dialogue between local groups and the Consultant Planning Engineer. The crisis factor is that situation that can precipitate action on the part of those persons subjected to making a decision of some sort. The comprehensive plan, usually available, takes into account the overall transportation needs and land use requirements of a community. This plan may or may not be up-to-date. Allowing citizen participation in the planning process results in the establishment of current community needs and goals. Dialogue between citizens and the engineer enhances community interest in the development of a plan. The result, then, of public participation through dialogue in the planning process is identification and relative priority of the facilities desired. Spatial location of these facilities, tempered by physical limitations, desired land-use requirements, and the limits of available area is that part of the work left to the engineer as implementive planning. The report deals specifically with the Ketchikan waterfront and the use of implementive planning in its development. (Poertner)
W75-06055

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
For primary bibliographic entry see Field 2E.
W75-06070

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
D. M. King, and D. A. Storey.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-240 918, $4.75 in paper copy, $2.25 in microfiche. University of Masachusetts Amherst Water Resources Research Center Publication No 40 - Special Report 1974. 73 p, 8 fig, 20 tab, 44 ref, 2 append. OWRT-A-046-MASS(1), 14-31-0001-3821.

Descriptors: Coasts, Management, *In-put-output analysis, *Massachusetts, *Planning, *Model studies, Economic impact, Environmental effects, *Regional analysis.
Identifiers: *Cape Cod(Mass).

The basic problem in coastal zone management is to determin how the limited set of coastal land and water resources should be allocated among a number of competing human uses or activities. The application of input-output analysis to the coastal zone resource planning process was investigated. The input-output model provides a potential method of displaying within a single framework the economic and environmental impacts of a change in the mix of coastal activities and of displaying tradeoffs between economic and environmental objectives. The economic portion of the model is given empirical content for shoreline activities within a specific planning region, the Cape Cod area of Massachusetts. Suggestions are made for the environmental portion of the model, but empirical data were not developed for that portion of the model. A critical discussion is provided about the potential and limitations of this model as a tool in the coastal planning process.
W75-06299

SIMULATION TECHNIQUES FOR WATER PROJECT ANALYSES,
Texas State Office of Information Services, Austin.
M. L. Holloway, and L. F. Tischler.
Journal of the Irrigation and Drainage Division, American Society of Civil Engineers, Vol 100, No IR3, Proceedings paper No. 10784, p 211-229, September 1974. 7 fig, 4 ref. OWRT C-2070(no.3360)(4).

Descriptors: *Water management(Applied), *Multiple-purpose projects, *Simulation analysis, *Planning, *Irrigation, *Economic impact, *Environmental effects, *Social aspects, Methodology, Input-output analysis, Aquatic environment, Long-term planning, Resource allocation, Water allocation(Policy), Terrestrial habitats, Reserch, Analytical techniques, Regional analysis, Mathematical models, Systems analysis.
Identifiers: Comprehensive analysis.

Described is a set of analytical tools designed to measure and evaluate market and nonmarket costs of large water resource systems; selected components may be useful for analyzing individual small projects or for a general application to a system of small projects. Three major areas are considered: economic, environmental and social. In the economic area, a regional input-output model, modified to operate in a simulation framework, is used to estimate demand and output in the regional economy subject to primary resource constraints, which include water. Environmental effects of water development and management are estimated by using a simulation model of the aquatic environment. Social impacts of water resource systems are considered through selected social indicators and the differences between the actual and the perceived measures of these indicators over the life of a project. The interrelationships between the three components are examined. A suggested procedure to systematically investigate water resource development questions is outlined. Possible questions are listed under the topics of water supply, recreation, and flood control. Finally, applications, recommendations, and limitations of the techniques in analyzing small projects are considered. (Bell-Cornell)
W75-06328

6B. Evaluation Process

AN ECONOMIC ANALYSIS OF THE PROPOSED WATER RESOURCES PROJECT FOR THE UPPER FRENCH BROAD RIVER BASIN IN WESTERN NORTH CAROLINA,
Georgia Univ., Athens.
J. Sellers.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 563, $9.25 in paper copy, $2.25 in microfiche. PhD thesis, 1972. 312 p, 6 fig, 12 tab, 189 ref, 3 append. OWRR A-040-GA(1).

Descriptors: *Water resources development, *River basin development, *Evaluation, *Cost-benefit analysis, North Carolina, Project planning, Social aspects, Economic impact, Recreation, Regional economics, Flood control, Water pollution control, Water supply, Reviews, Methodology, Welfare(Economics), Multiple-purpose projects.
Identifiers: Upper French Broad River Basin(NC), Case study.

A procedure is developed and tested for evaluating water resources projects based on economic, social, legal, and environmental considerations. The areas of economic theory and public finance that apply to water resources investments supplied the basis for the analysis. Additional information concerning the environmental aspects were integrated with the economic and public finance aspects to develop a systematic process for evaluation. The proposed water resources project for the Upper French Broad River Basin in North Carolina was completely based on the methodologies that have been developed up to the present time. The case analysis indicates that the proposed project would be undesirable under present conditions. If the project were evaluated using currently acceptable discount rates and the benefits generated by the construction agency (TVA), the project would be rejected by any criterion that requires benefits to exceed costs. The study shows the necessity of updating any project evaluation if there is a time lag between planning and implementation. Water resources projects evaluation techniques should be broadened to include the possible external effects on the surrounding environment and the loss of resources of the area and the nation as a whole, and the options for future generations. (Auen-Wisconsin)
W75-05857

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK. EXECUTIVE SUMMARY.
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11270, $3.75 in paper copy, $2.25 in microfiche. Maritime Administration, Report MA-GEN-740-74058, May 1974. 35 p, 10 fig.

Descriptors: *Transportation, *Hazards, *Chemicals, *Costs, Safety, Inland waterways, Analysis, Highways, Pipelines, Railroads, Barges, Risks, Water pollution control, Insurance, Penalties(Legal).
Identifiers: *Hazardous substances, Acrilonytrile, Anhydrous ammonia, Benzene, Caustic soda, Chlorine, Ethylene glycol, Methanol, Styrene, Sugar, Sulfuric acid.

Comparative economic costs and safety risks (to people, property, and the environment) of transporting ten nonremovable hazardous substances in bulk over varied origin-destination combinations including inland waterways, rail, highways, and pipelines are summarized. In every case, the total per-ton cost of barge is less than three-quarters that of the next mode, and for some the fraction is as low as one-fifth to one-third. Only anhydrous ammonia transport by pipeline cost is a little below that of the barge mode, but neither is presently fully utilized. Insurance costs are normally buried in line haul rates (for carriers) or in the overall liability coverage of the large corporations that are shippers and consignees. Barge transport generally involves less urban exposure to risk than does truck or rail. The recurrence interval (years) of spill causing accidents was longest for barge by a wide margin; truck was usually next. Barge is, however, the only transportation mode likely to present a water pollution hazard. The future of barge transport of these hazardous substances will be contingent on the penalties to be imposed by the EPA and on whether it is possible for the carrier or shipper to buy insurance against these penalties. Spill prevention programs are discussed. (Auen-Wisconsin)
W75-05858

INTERSTATE PLANNING FOR REGIONAL WATER SUPPLY AND POLLUTION CONTROL.
Delaware River Basin Commission, Trenton, N.J.
For primary bibliographic entry see Field 5G.
W75-05860

A METHODOLOGY FOR ASSESSING ECONOMIC RISK OF WATER SUPPLY SHORTAGES,
Water Resources Engineers, Inc., Springfield, Va.
G. K. Young, R. S. Taylor, and J. J. Hanks.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-752 153, $6.25 in paper copy, $2.25 in microfiche. Corps of Engineers, Institute for Water Resources, IWR Final Report 72-6, May 1972. 167 p, 31 fig, 16 tab, 2 append, 92 ref. DACW 31-71-C-0046.

Descriptors: *Water shortage, *Economic prediction, *Risks, *Costs, Water works, Water management(Applied), Computer models, Droughts, Methodology, Water supply, Water users, Income, Assessments, Planning.
Identifiers: *Risk analysis, York(Pa), Case study, Income losses.

The described methodology determines regional losses and risks in an urban-industrial area for actual and potential water shortage conditions. Sector losses were identified as households, industrial, and commercial users. Probability-loss functions are defined for both short- and long-term losses arising from specific water supply and use situations under typical conditions. The methodology is useful as a planning tool for both estimating requirements of future water supplies, and in allocating short supplies during emergencies. Water supply shortage is defined as 'any time the water purveyor chooses, or is forced into, a position where he cannot supply the total demand for water in the system.' The simulation data consists of the expected water demand, the hydrology of the supply stream(s), the reservoir storage, and information describing how the system is to be managed. The specific application of the simulation within an optimization framework to York, Pennsylvania determines an optimum reservoir storage which would minimize the economic risk of water shortage, i.e., that after completion of additional reservoir capacity in 1972, the level of regional risk in York is about $40,000 per year, or about 30 cents per capita. Reduction of this risk to $20,000 would require an additional 750 million gallons of storage. (Auen-Wisconsin)
W75-05861

THE USE OF MARKET SEGMENTATION IN PLANNING FOR A RECREATION-BASED ECONOMY,
Wisconsin Univ., Madison. Graduate School of Business Administration.
W. A. Strang.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11136, $4.25 in paper copy, $2.25 in microfiche. Technical Report No. 5 (WIS-SG-71-205), February 1971. 53 p, 27 tab, 7 ref, 1 append.

Descriptors: *Water quality, *Economic impact, *Tourism, *Econometrics, Recreation.
Identifiers: *Door County(Wis), Markets analysis.

The daily expenditures made by segments of the tourist market and the total economic impact that these expenditures had on Door County, Wisconsin economy are analyzed. The major market segments identified were residence, occupation, age, party size, accommodations, and first or repeat visit. Expenditure data was directly related to income, although differences in total expenditures among the several activity groups varied significantly. The direct expenditures made to each industry by the market segment were multiplied by the industry multiplier to obtain the total economic activity generated. By dividing the total direct and indirect activity generated by the total direct expenditures made by each segment, a multiplier for the market segment was obtained. The county received $13,164,000 from tourists in 1968, and through the multiplier effects, it gained $28,619,000 of total economic activity. Although lodging, eating and drinking, food stores, and automobile service industries received 59% of the direct benefits, the households and government received almost 50% of the indirect benefits. The county planners have an opportunity to shape their plans for facilities and promotion to attract specific groups that will have the greatest positive economic impact, but the benefits should be evaluated against the costs associated with attracting and serving that segment. (Auen-Wisconsin)
W75-05862

SAN JUAN RIVER HYDROELECTRIC PROJECT. FEASIBILITY REPORT.
Tippetts-Abett-McCarthy-Stratton, New York.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-212 373, $8.50 in paper copy, $2.25 in microfiche. Agency for International Development, Report No. TA/OST-AN-71-6-4, June 1971. 261 p, 53 fig, 36 tab, 4 append. AID 514 L-025.

Descriptors: *Dams, *Hydroelectric power, *Reservoirs, *Benefit-cost ratio, *Dam design, Water control, Earth dams, Damsites, Economic feasibility, River regulation, Construction costs, Cost-benefit analysis, Water storage, South America, Reservoir sites, Project planning, Annual costs, Social aspects, Hydrology, Soils, Lumbering, Power marketing.
Identifiers: *San Juan River(Colombia), *Dam crest elevation, Damsite selection, Pulpwood potential.

On the basis of benefit-cost ratios and physical analyses, the San Juan River Project is technically and economically feasible and will provide a large source of low-cost power and energy for the Columbian interconnection network. After considering various combinations of dam crest elevations, sites, and system capacities, and in order to meet proposed market demands of electric power for 1980, a 38-meter crest, 12-generator dam was recommended for the Malaguita site. In the recommendation are the specifications for all of the project components, including power plant, dam, dikes and the preliminary associated construction. Power will be transmitted to the national system at Yumbo. The total cost is estimated to be 390 million dollars. If the project is to be implemented, investigations of its impact on the population and economy of the affected area are necessary. If the yearly timber potential of the 400,000 cubic meters in the proposed reservoir is to be exploited, then development of the timber market should start as soon as possible. Additional physical and economic investigations are required on the soil, subsoil and topographic characteristics of certain areas of the reservoir and dam, and on the feasibility of constructing a navigation channel. (Becker-Wisconsin)
W75-05863

MICHIGAN'S 1969 SALMON AND TROUT SPORT FISHERY,
Michigan Dept. of Natural Resources, Lansing.
G. C. Jamsen, J. R. Ryckman, and F. W. Jamsen.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-73-11005, $4.25 in paper copy, $2.25 in microfiche. Research and Development Report No. 203, June 1970. (NOAA-73052404). 50 p, 1 fig, 7 tab, 3 append. AFSC-8.

Descriptors: *Michigan, *Fisheries, *Sport fish, Lake trout, Salmon, Benefits, Rainbow trout, Chinook salmon, Recreation.
Identifiers: Coho salmon.

The results of a survey of eligible fishermen who fished for coho and chinook salmon and steelhead and lake trout in 1969 in Michigan are described. The intent was to guide public and private investment in the Great Lakes and related programs. The sampling frame consisted of license holders that were eligible to fish in Michigan. Approximately 450,000 licensed anglers spent 7.75 million days fishing for all species, or an average of 17 fishing days per fisherman. Of this total statewide effort, generated by an estimated 180,000 anglers, 23%, or 1.8 million angler-days, were spent specifically fishing for salmon, steelhead and lake trout. Only 12% of all fishermen who fished for salmon, steelhead and lake trout were nonresidents. The four neighboring states, Illinois, Indiana, Ohio, and Wisconsin, accounted for 88% of the non-resident salmon and trout fishermen. Better than 60% of the fishing activity for salmon and trout occurred in Lake Michigan. An additional 28% of Great Lakes fishing effort occurred in Lake Superior. Lake Michigan anadromous streams accounted for more than three-quarters of the total stream effort. Streams tributary to Lake Huron and Lake Superior accounted for 13% and 9% of the fishing activity, respectively. (Auen-Wisconsin)
W75-05864

1970-71 YAQUINA BAY RESOURCE USE STUDY,
Oregon Fish Commission, Portland. Div. of Management and Research.
T. Gaumer, D. Demory, L. Osis, and C. Walters.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-10816, $3.75 in paper copy, $2.25 in microfiche. February 1974. 32 p, 7 fig, 17 tab. DACW 57-72-C-0138, NOAA N208-0073-72(N), N04-3-208-55.

Descriptors: *Estuaries, *Intertidal areas, *Estuarine fisheries, Recreation, Commercial fishing, Shellfish, Commercial shellfish, Oregon, Fish harvest, Varieties.
Identifiers: *Yaquina Bay(Ore).

The 1971 Yaquina Bay, Oregon survey of recreational use of marine food fish, shellfish, and other miscellaneous invertebrates is summarized. The bay is located 152 miles south of the Columbia River and consists of 3,910 acres containing 1,353 acres of tidelands. The principal boat fishing areas, clam beds, eel grass beds, commercial oyster leases and potential oyster growing areas, food production areas, fish feeding areas, fish migration routes, and known herring spawning areas were mapped. A total of 100,700 resource user trips were expended on the bay during the study, which harvested 626,500 animals. July was the peak activity month for the combined fisheries. Principal species harvested by boat anglers were Dungeness crab (39%), Pacific herring (15%), and starry flounder (14%). Fish represented 87% of the shore anglers' catch with Pacific herring, starry flounder, and northern anchovy the main species landed. Clams comprised 90% of the tideflat users' total take with cockle, softshell, and gaper clams the principal species dug. Black rockfish, lingcod, and cabezon were the main species harvested by skin divers. Tideflat users harvested 440,400 or 70% of the animals taken. Commercial marine food fish and shellfish caught totaled 67,968 pounds valued at $97,121 (fisherman's level). Oysters, the principal harvest, were valued at $81,000. (Auen-Wisconsin)
W75-05865

ECONOMICS OF SMALL WATERSHED PLANNING IN MINNESOTA,
Minnesota Agricultural Experiment Station, St. Paul.
T. E. Daves.
Technical Bulletin 295, 1974. 47 p, 2 fig, 16 tab, 28 ref.

Descriptors: *Watershed management, *Project planning, *Minnesota, *Watershed Protect. and Flood Prev. Act, Legal aspects, Small watersheds, Water districts, Institutional constraints, Induced costs, Associated costs, Evaluation, Amortization, Interest rates, Project benefits, Economic feasibility, Cost-benefit ratio.

Small watershed projects under PL 566 are largely financed with federal funds and are based on the primary evaluation criterion as to whether the resources expended are allocated so that they will yield an equally high return in social benefits as they would in alternative uses. However, because of their legal, political, and operational characteristics, institutions involved in watershed planning in Minnesota are unable (or unlikely) to arrive at public expenditure decisions that are economically efficient. Planning and project evaluation strategies are critized and suggestions for their improvements are given. For example, interest rates used in developing work plans for the

study projects (2-1/2 to 3-1/8%) are too low to reflect the real opportunity cost of capital. When the slightly higher 4% rate is assumed, five of the 13 projects are found economically not viable. The use of net benefit-cost ratio instead of total benefit-cost ratio obscures the real economic efficiency of projects. Watershed districts are financially limited in their project development and management functions. Among the recommended changes in planning procedures for efficient investment allocation are that interest rates used in estimating costs and in discounting should reflect true opportunity costs and time discount rates of society accurately. (Auen-Wisconsin)
W75-05866

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA. APPENDIX A: WATER SUPPLY.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 5F.
W75-05867

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES: CEMENT INDUSTRY,
Southern Research Inst., Birmingham, Ala. Economic Research and Planning Section.
For primary bibliographic entry see Field 5G.
W75-05869

A MODAL ECONOMIC AND SAFETY ANALYSIS OF THE TRANSPORTATION OF HAZARDOUS SUBSTANCES IN BULK, FINAL REPORT (REVISED).
Little (Arthur D.), Inc., Cambridge, Mass.
Available from the National Technical Information Service, Springfield, Va 22161 as COM-74-11271, $8.50 in paper copy, $2.25 in microfiche. Maritime Administration Report MA-GEN-740-75006, May 1974. 266 p, 3 fig, 47 tab, 11 ref, 6 append. C-76446.

Descriptors: *Transportation, *Hazards, *Chemicals, *Comparative costs, Risks, Safety, Inland waterways, Railroads, Barges, Pipelines, Highways, Water pollution sources, Federal Water Pollution Control Act, Frequency analysis, Environmental effects, Regulation.
Identifiers: *Hazardous substances, Safety regulations, Styrene, Acrylonitrile, Sulphuric acid, Liquid chlorine, Ethylene glycol, Methanol, Caustic soda, Benzene, Liquid anhydrous ammonia, Refined sugar.

Ten hazardous substances were chosen to show the varied nature of shipping hazards in inland waterways and the cost/risk tradeoffs that would occur in transport by alternative transportation modes. The risks involved of shipping each substance were quantified utilizing (1) the expected frequency and quantity of accidental releases for each transportation mode based on historical data, (2) the hazard due to the release based on physical interactions that take place on land or water, (3) risks to people, property and the environment are evaluated from the hazard assessment and knowledge of the vulnerable resources in the vicinity of the release. For the cargo flows in question, the cost of barge transportation is considerably below that of rail or truck. With the exception of chlorine and benzene, the annual expected exposure associated with the transport of these substances is lowest for barges. The truck mode is equally safe, and both barge and truck are substantially safer than rail. The future of transporting hazardous substances by barge seems to hinge not only on the exact nature of the penalty system to be imposed by the EPA, but also on whether it is possible for carriers/shippers to buy insurance against civil penalties. (Auen-Wisconsin)
W75-05870

PROGRAM PLAN FOR ENVIRONMENTAL EFFECTS OF ENERGY,
MITRE Corp., McLean, Va.
For primary bibliographic entry see Field 9D.
W75-05871

ECONOMIC ANALYSIS OF EFFLUENT GUIDELINES. THE ELECTROPLATING INDUSTRY, COPPER, NICKEL, CHROMIUM AND ZINC.
Kearney (A. T.) and Co., Inc., Chicago, Ill.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-236 595, $7.50 in paper copy, $2.25 in microfiche. EPA report 230 2-74-007, September 1974. 231 p, 2 fig, 119 tab, 16 ref, 1 append. EPA 68-01-1545.

Descriptors: *Metals, *Pollution abatement, *Economic impact, *Industries, Standards, Zinc, Nickel, Copper, Chromium, Operating costs, Capital costs, Unemployment.
Identifiers: *Electroplating industry.

The economic effects of various alternative effluent and waste treatment technologies on firms which perform copper, nickel, chromium, and zinc electroplating only, are evaluated in terms of product price increases, effects upon employment, the continued viability of affected plants, and other competitive effects. This study was limited to independent shops of less than 100 employees as it is believed that larger firms would not be severely impacted by the waste treatment guidelines. Two alternatives, A and B, were established for treatment levels for both direct dischargers and municipal system users, i.e., Best Practicable Technology and Best Available Technology. Small direct dischargers will be required to install technology to meet less stringent standards. The total investment costs required for this industry to meet the 1977 standards are approximately $242 million for Alternate A and approximately $379 million for Alternate B. The annual operating cost increase is expected to amount to $85 million for Alternate A and $135 million for B. The average price increase will be 8.3% for municipal dischargers and 15.5% for direct dischargers according to Alternate A; the price increase for Alternate B is 15.5% for both dischargers. The employment reduction for Alternate A totals 1824, or 5.4% and for B, 2649, or 7.8%. (Auen-Wisconsin)
W75-05873

MODERN TECHNIQUES IN PLANNING THE MANAGEMENT OF WILDLAND RESOURCES,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 4A.
W75-05915

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
G. Pemberton.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 14-20, 1974. 2 ref.

Descriptors: *Regional analysis, *Regional development, *River basin development, *Comprehensive planning, Environmental effects, Water resources, Administration.
Identifiers: *New Zealand.

The importance of thorough and extensive regional planning was discussed. A method of comprehensive planning of regional water and soil resources, called integrated river basin development, was outlined. The information required for this method is basic to any sound regional planning. Finally, the present administrative structure and the proposed Local Government Act were commented on from a regional planning point of view. (Dawes-ISWS)
W75-05952

OPTIMUM RUNOFF FORECAST FOR A FLOOD-CONTROL RESERVOIR,
Toronto Univ. (Ontario). Inst. of Environmental Sciences and Engineering.
For primary bibliographic entry see Field 4A.
W75-05994

METHODOLOGY FOR OPTIMIZATION OF FLOOD PROTECTION MEASURES ILLUSTRATED BY AN EXAMPLE IN THE GERMAN FEDERAL REPUBLIC,
Karlsruhe Univ. (West Germany). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05995

BENEFIT-ESTIMATE OF DRAINAGE AND FLOOD-CONTROL WORKS IN SMALL WATERSHEDS OF SEMI-ARID CLIMATE,
Technion-Israel Inst. of Tech., Haifa.
B. Z. Kinori.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 315-327. (1973) 3 fig, 12 ref.

Descriptors: *Estimated benefits, *Flood control, *Agricultural watersheds, *Graphical analysis, Small watersheds, Arid climates, Statistical methods, Direct benefits, Drainage.
Identifiers: Israel.

Discussion was restricted to the direct benefits achieved by drainage and flood-control works on agricultural areas and small watersheds in semi-arid climatic conditions only. The question of the indirect and intangible benefits, the calculation of costs and the rate of return (benefit-cost ratio, etc.) were not included. The author did not intend to give a ready-made solution of this complex problem, but to point out the difficulties and shortcomings of the widely used methods of benefit calculations in general and in semi-arid small watershes in particular. Much study and research will have to be carried out in order to be able to suggest a more reliable method. An attempt was made for a graphical-statistical analysis of the problem. (See also W75-05973) (Humphreys-ISWS)
W75-05997

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
(1973). 41 p.

Descriptors: *Water resources institute, *Projects, *Training, *Flood control, Planning, Benefits, Evaluation, Harbors, Water resources, Droughts, Economics, Publications.

The work accomplished during calendar year 1972 was briefly described, and the direction of future efforts was indicated. Methodological investigations included flood control benefit evaluation, planning for better harbors and ports, measuring the impact of employment generation from water resources projects, measurement of the economic risk of water supply shortages from drought, and assessment of non-market values. Research findings reported were U.S. deepwater port needs, analysis of Corps environmental statements, and an evaluation of public workshops on the Puget Sound and adjacent waters study. Also discussed were special studies in social and cultural dimensions as related to the Corps of Engineers mission and professional development programs. Published reports and papers were listed. (Humphreys-ISWS)
W75-06018

POWER PLANT SITING-SOCIAL/POLITICAL CONSIDERATIONS,
Northern States Power Co., Minneapolis, Minn.
R. S. McGinnis.
Preprint No. 1528, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 5 p.

Descriptors: *Sites, *Powerplants, *Power systems operation, *Political aspects, *Social aspects, *Social values, Planning, Communication, Coordination, Project planning.
Identifiers: Public participation.

Selecting a site for a large power generating plant or any large industrial complex involves a consideration of the local community. The social considerations may vary from one region to another and the only way to define these is to go directly to the people. Northern States Power Company (NSP) in January, 1970, invited approximately 30 environmental and conservation groups in the State of Minnesota to attend meetings to discuss the future siting and development of power plants and transmission lines in its service area. All groups contacted accepted and sent a representative to the Plant Siting Task Force (PSTF) formed by NSP. NSP invited the participation of Minnesota's environmental cabinet, consisting of state department heads, and they also accepted. Weekly meetings of the PSTF began in March and the PSTF was asked to make a recommendation on the location of its generating station. After many meetings, the site recommended by the citizens group was selected. NSP is continuing to use the task force in hope that it will not only avoid the usual public resistance, but also provide the highest degree of environmental protection. (Poertner)
W75-06050

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06067

PLANNING WATER RESOURCES PROJECTS TO MAXIMIZE ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
W. D. Fairchild.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 5-14.

Descriptors: *Planning, *Environmental effects, *Water resources development, *Federal project policy, *Alternate planning, Colorado River Basin, Social impact, Project planning, Project benefits, Evaluation, Alternative planning, Environmental engineering, Water policy, Governments.
Identifiers: *National Environmental Policy Act, Impact statements, Western U.S. Water Plan Study.

In the formulation of environmental alternatives, structural as well as nonstructural and nondevelopment plans are considered in the water planning effort. Environmental alternatives must be acceptable, effective and efficient as well as representative of recognized practices in the social, natural and physical sciences for formulation of plans. The 1968 Colorado River Basin Project Act conducted two interrelated studies: (1) to determine the feasibility of augmenting supplies of the Colorado River; and (2) to develop comprehensive reconnaissance plans to meet water needs of the 11 states west of the Continental Divide. Environmental planning entails several steps as described by the Water Resources Council: (1) identification of existing and projected problems; (2) evaluation of resource capabilities and future conditions; (3) formulation of alternative plans to achieve varying levels of contributions to the environmental quality objective; (4) evaluation of differences among alternative plans; and (5) a selection of a recommended plan of action from among alternatives developed and analyzed, based on the evaluation of the tradeoffs among the various objectives. An interim evaluation device has been developed by the management team of the Western U.S. Water Plan Study. Criteria used to evaluate and describe environmental conditions are: quantity, quality, human influence, uniqueness, magnitude and significance. These factors provide perspectives on relative availability of the resource category within the planning setting, and provides maximum economic efficiency for environmental planning. (Poertner)
W75-06068

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06069

HYDROLOGIC ESTIMATION PROCEDURES IN WATER RESOURCES PLANNING,
Catholic Univ. of America, Washington, D.C.
For primary bibliographic entry see Field 2E.
W75-06070

RENOVATED WASTE WATER: THE QUESTION OF PUBLIC ACCEPTANCE,
George Williams Coll., Downers Grove, Ill. Dept. of Counseling Psychology.
For primary bibliographic entry see Field 5D.
W75-06096

PUBLIC ACCEPTANCE OF RENOVATED WASTE WATER: MYTH AND REALITY,
Southern Illinois Univ., Carbondale. Dept. of Geography.
For primary bibliographic entry see Field 5D.
W75-06097

A SOCIOLOGICAL APPROACH TO THE PROBLEM OF WATER POLLUTION,
New York State Coll. of Agriculture and Life Sciences, Ithaca, N.Y. Dept. of Rural Sociology.
For primary bibliographic entry see Field 5G.
W75-06099

A MOSAIC PATTERN OF BALANCED LAND-WATER PLANNING FOR COTTAGE DEVELOPMENT AND LAKE PLANNING,
Toronto Univ. (Ontario).
R. Jaakson.
Plan Canada (Journal of the Canadian Institute of Planners), Vol 14, No 1, p 40-45, October 1974. 2 fig.

Descriptors: *Recreation, *Lakes, *Land management, *Optimum development plans, *Planning, *Canada, Access routes, Land use, Water management.
Identifiers: Ontario(Can.), *Temagami Lake(Can.), Cluster development, Ribbon development, Development-in-depth.

Lakes on the Pre-cambrian Shield in Ontario have come under increasing pressure for development for lake cottages and recreational uses. Past solutions of either ribbon development around the lake or development in depth receding from the lake side have proved inefficient and unacceptable in maintaining a high level of environmental quality. A new concept for planning of lakes and development of cottage subdivisions is outlined. By removing pressures for private development and subsequent environmental deterioration, the subdivisions cluster cottages in the intervening land between lakes, thereby reserving the shorelines for public ownership and use. Under public management, the environmental quality of the lakes is further enhanced by determining specific uses for the lakes, reducing number of road accesses (disrupting the ecosystem), locating a central efficient disposal system, and enforcement of other general regulations. The plan is already operative at Temagami Lake in Ontario, and the social opportunities it has opened to lower income groups are evident. This phase monitored development allows for continued planning so as to further enhance and anticipate changes. (Salzman-North Carolina)
W75-06101

CITY OF FRESNO--LONG RANGE PLAN: METROPOLITAN AREA, TRUNK SEWER SYSTEM.
Jenks and Adamson, Palo Alto, Calif.
For primary bibliographic entry see Field 5D.
W75-06102

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
For primary bibliographic entry see Field 6D.
W75-06104

NATURAL ENVIRONMENT AND DEVELOPMENT, A PLANNING BACKGROUND REPORT.
Hillsborough County Planning Commission, Tampa, Fla.
For primary bibliographic entry see Field 4B.
W75-06105

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
B. V. Dall.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 940, $5.75 in paper copy, $2.25 in microfiche. PhD Dissertation, September 1972. 223 p, 11 fig, 13 tab, 105 ref, append. OWRT B-035-PA(2). 14-31-0001-3327.

Descriptors: *Management, *Water resources, Waste water treatment, Waste water disposal, *Legislation, *Water law, Social aspects, Psychological aspects, Political aspects, Judicial decisions, Federal government, Community development, Administrative decisions, Systems analysis, *Social change, *Pennsylvania, Water quality standards, *Attitudes, Water policy.
Identifiers: *Social perceptions, Water service needs, Water service systems, Socio-political bargaining.

The laws of Pennsylvania and of the Nation are examined and used to develop an analysis of change in social perceptions of water service needs and change in the legal-institutional setting in water management organizations. The analysis shows that a condition of institutional obsolescence resulted chiefly because of growth in social perceptions of the interrelatedness of water resource connected activities. A significant change in man-resource relations occurred in Pennsylvania and the Nation. The study's main objective is to demonstrate the need for an interdisciplinary approach for studying water management problems and the associated difficulties. The value

of the broad interdisciplinary approach is shown to be in its high level of generality and relevancy in problem formulation. There is analysis of research in several relevant disciplines leading to an integrated view of current water management problems and the development of an integrated model of the community water service system. Knowledge about the environment of governance of such systems is used to construct a conceptualized bargaining model which structures key entities and identifies functional relationships which exist between them. Taken together the models serve as an interdisciplinary framework for the formulation and study of water management problems. (Sink-Penn State)
W75-06193

THE ROLE OF CITIZEN ADVISORY GROUPS IN WATER RESOURCES PLANNING,
Massachusetts Univ., Amherst. Dept. of Political Science.
M. O. Ertel.
Available at W.R.R.C., UMass/Amherst, for $3.00. Also available from the National Technical Information Service, Springfield, Va 22161 as PB-240 877, $5.75 in paper copy, $2.25 in microfiche. University of Massachusetts, Amherst, Water Resources Research Center Publication No. 43 - Completion Report FY-75-1, July 1974. 141 p, 14 fig, 48 ref, 2 append. OWRT B-036-MASS(1). 14-31-0001-4093.

Descriptors: *Planning, *Social participation, *Interstate commissions, Interstate compacts, History, *Social function, Social needs, *Institutional constraints, Organizations.
Identifiers: *Citizen Advisory Groups.

A systematic, case-study observation was made of the citizen advisory groups operating in conjunction with three reconnaissance level planning studies of the New England River Basins Commission: the Long Island Sound Study, the Southeastern New England Study and the Connecticut River Basin Program. The activities of a predecessor to these groups, 'The Citizen Review Committee on the Connecticut River Basin Comprehensive Water and Related Land Resource Investigation' are briefly reviewed, as are the activities of the scientific advisory groups associated with the three on-going studies. As innovative attempts to operationalize the concept of citizen participation in the planning process, these groups and their supporting staffs have faced many difficulties in defining their roles and developing appropriate procedures and functions. The ways in which these groups have dealt with these problems and their experience in general are described for the benefit of other citizen advisory groups and planning agencies. While citizen advisory groups can serve as only one component of a public participation program, they can perform certain valuable functions on their own, while also providing a key link to other strategies included in such a program. A set of guidelines derived from this research is included for the use of planning agencies seeking to maximize the effectiveness of citizen advisory groups.
W75-06198

A BENEFIT-COST ANALYSIS OF ALTERNATIVE LAND DISPOSAL WASTE WATER METHODS IN AN URBAN ENVIRONMENT,
Missouri Univ., St. Louis. School of Business Administration.
For primary bibliographic entry see Field 5D.
W75-06203

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-06297

USE OF ECONOMIC-ENVIRONMENTAL INPUT-OUTPUT ANALYSIS FOR COASTAL PLANNING WITH ILLUSTRATION FOR THE CAPE COD REGION,
Massachusetts Univ., Amherst. Dept. of Agricultural and Food Economics.
For primary bibliographic entry see Field 6A.
W75-06299

6C. Cost Allocation, Cost Sharing, Pricing/Repayment

ESTIMATING THE VALUE AND INCIDENCE OF RECREATION BENEFITS FROM A BEACH EROSION CONTROL PROJECT,
Institute for Water Resources (Army), Alexandria, Va.
M. R. Krouse.
IWR Paper 74-P4, October 1974. 33 p, 8 fig, 2 tab, 7 ref.

Descriptors: *Analytical techniques, *Shore protection, *Recreation, *Estimated benefits, Economics, Estimating, Evaluation, Erosion control, Beach erosion, Regression analysis, Maryland.
Identifiers: Ocean City(Maryland).

The primary objectives of this empirical study were to examine the feasibility of (1) estimating the value of shoreline recreation experience using the zone-cost demand analysis technique and (2) estimating the value of the shoreline experience to user subgroups classed by social and economic characteristics as a means of obtaining benefit incidence information. The study applies to a shoreline experience in a resort setting and illustrates that recreation value for beaches can be estimated using zone-cost analysis and that individual demands and values for different user groups can also be estimated to gain incidence information. An accurate measure of user surplus value requires that demand be estimated according to an average site expenditure value within the length-of-stay group. The study indicates that the business sector would likely be the major direct beneficiary of an erosion control project developed at a commercial beach. The question of what incidence information is relevant is still unresolved. Information about benefits to local and non-local sectors would be a powerful tool for determining and arguing for appropriate and acceptable cost-sharing arrangements. While benefit incidence is primarily dealt with, it is necessary to realize that the incidence problem involves far more than just tracing benefit flows. (Auen-Wisconsin)
W75-05859

COST SHARING FOR SHORELINE PROTECTION,
National Bureau of Standards, Washington, D.C. Technical Analysis Div.
H. E. Marshall.
Army Engineer Institute for Water Resources, Fort Belvoir, Va., IWR Contract Report 74-7, August 1974. 63 p, 4 fig, 14 tab, 49 ref, 2 append. ACOE.

Descriptors: *Cost sharing, *Shore protection, Federal project policy, Equity, Multi-purpose projects, Cost allocation, Management, Coastal structures, Insurance.

To provide the Army Corps of Engineers with an evaluation of existing and alternative cost-sharing rules for shoreline protection with respect to efficiency, equity, and administrative feasibility, cost-sharing is evaluated in terms of its incentive effects and the fact that local interests will not necessarily choose from a combination of techniques or the scale that is optimal from the national viewpoint. Existing cost-sharing rules, those being proposed in legislation, and those recommended here are compared and a model illustrates how cost-sharing affects local decision making in project planning. Recommended are (1) The Association Rule, which requires local beneficiaries of shoreline protection to share in all of the project costs in the proportion of local benefits to national benefits at the margin. A second-best solution is to retain the existing rule for beach erosion control and to raise local cost shares to a flat 50% for hurricane protection and emergency programs. (2) All management and engineering techniques should be subject to the same percentage cost-sharing rule. (3) All categories of project costs, including construction, lands, easements, etc., should have the same percentage cost share applied to them. (4) Federal cost sharing should be used as an incentive to nonfederal interests to comply with certain land-use requirements. (Auen-Wisconsin)
W75-05872

FLOOD DAMAGE IN NEW ZEALAND,
Ministry of Works, Wellington (New Zealand).
For primary bibliographic entry see Field 4A.
W75-06001

EVALUATION OF AGRICULTURAL POLICY ALTERNATIVES TO CONTROL SEDIMENTATION,
Illinois Univ., Urbana. Dept. of Agricultural Economics.
For primary bibliographic entry see Field 4D.
W75-06079

A REGIONALIZATION PROCEDURE WITH OPTIMIZING CHARACTERISTICS FOR WATER DISPOSAL SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06195

DEVELOPMENT OF ECONOMIC CRITERIA FOR REGIONALIZATION OF A WASTE WATER MANAGEMENT SYSTEM,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 5D.
W75-06200

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06220

ENGINEERING, LEGAL AND ECONOMIC ASPECTS OF STORM SEWER ASSESSMENTS,
Iowa Univ., Iowa City. Dept. of Economics.
For primary bibliographic entry see Field 5D.
W75-06297

6D. Water Demand

COORDINATION OF REGIONAL WATER RESOURCE SUPPLY AND DEMAND PLANNING MODELS,
Case Western Reserve Univ., Cleveland, Ohio. Systems Engineering Div.
For primary bibliographic entry see Field 6A.
W75-05856

PEAK RATIOS AND ALTERNATE MODEL FACTORS FOR RESIDENTIAL WATER USE IN PUERTO RICO,
Puerto Rico Univ., Mayaguez.
A. Guilbe.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 831,

$4.25 in paper copy, $2.25 in microfiche. University of Puerto Rico Water Resources Research Institute, Mayagues, Completion Report, August 1974. 61 p, 20 fig, 12 tab, 7 ref. OWRT A-038-PR(1).

Descriptors: *Distribution systems, Peak discharge, *Water demand, Model studies, *Puerto Rico, *Water utilization, *Water users, *Alternative water use, Regression analysis, Data collections, *Municipal water.
Identifiers: Regression models.

The impact of residential water-use factors (other than assessed property valuation) on residential water-use in Puerto Rico. Estimating peak ratios were investigated for their application to the average water-use estimators previously developed. Data from sampled dwelling units in the cities of San Juan, Ponce and Mayaguez (on socio-economic factors and water usage) were subject, among other analyses, to: computer-generation of transformed water use data (water-use indices) to serve as basis for graphical analysis and model building; graphical analysis of the relationship between alternate water use factors (number of bedrooms per dwelling, equivalent index of bathroom water-using fixtures, number of people per dwelling unit, and number of people per bedroom) and the generated water-use indices; computer-generation of model parameters and the corresponding water-use models for each alternate factor whose impact residential water use was found 'significant', on the basis of a factorial experiment conducted regression plot-back analysis to determine the fitness and reliability of model parameters for each significant alternate factor; and the determination of maximum to average water-use indices. Of the four potential-alternate residential water-using factors studied, only two were significant: number of bedrooms per dwelling unit and the equivalent index of bathroom water-using fixtures. In both cases, the relationship between each alternate factor and the corresponding water-use index may be approximated by an exponential function, with the alternate factor as the independent variable and water use as the 'response' variable.
W75-06085

MEETING WATER DEMANDS IN THE CHINO-RIVERSIDE AREA.
California State Dept. of Water Resources, Sacramento.
Bulletin No 104-3, May, 1971. 27 p, 20 fig, 3 tab.

Descriptors: *Alternative costs, *Alternative planning, Management, *Groundwater resources, *Water demand, Hydrogeology, *Planning, Water resources development, *Water supply development, Surface water availability, Model studies, Water sources, Project feasibility, Comparative costs, *California.
Identifiers: Chino-Riverside Area(Calif.), Metropolitan Water District(MWD).

A wide range of alternative plans to be used as a guide by local agencies for selecting a plan for managing their groundwater supplies and facilities is presented. The study area includes 641 square miles of land changed from agricultural to urban uses, thereby changing supply from stream flow water to diverted and/or surface waters. Areas of geology, hydrology and operation economics were investigated. Data on locally available water supplies were used to construct a mathematical model of the ground water basin that simulated water responses under various postulated plans. The model was then used in the operational and economic phase to determine cost of water services although variance of factors such as pricing policy, quality of imported water, water demand, mean water supply and land use could not be predicted and values were assumed for the model. Using the modeling technique, 4 selected alternative plans for the period 1965 to 2015 were evaluated in terms of the economic impact caused by operational variables. Cost and change in water quality were analyzed and compared for efficiency in meeting future water demands. By extending the period of analysis to 2055, the value of groundwater in storage after 2015 was determined. (Salzman-North Carolina)
W75-06104

REGIONAL WATER AND WASTE WATER PLAN-NORTHWEST MICHIGAN.
Northwest Michigan Economic Development District and Regional Planning Commission, Traverse City.
For primary bibliographic entry see Field 5D.
W75-06106

6E. Water Law and Institutions

STUDY OF SINGLE-RESPONSIBILITY CONCEPTS FOR WATER POLLUTION CONTROL PROJECTS.
Bechtel Corp., San Francisco, Calif.
For primary bibliographic entry see Field 5G.
W75-05868

INTEGRATED RIVER BASIN DEVELOPMENT AND REGIONAL PLANNING IN NEW ZEALAND,
Nelson Catchment Board (New Zealand).
For primary bibliographic entry see Field 6B.
W75-05952

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06002

MANAGING WATER RESOURCE PROJECTS TO MAINTAIN ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 6G.
W75-06066

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
For primary bibliographic entry see Field 6F.
W75-06076

THE COLORADO: A WEARY RIVER,
For primary bibliographic entry see Field 4A.
W75-06100

THE BEACH EROSION HAZARD,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 2J.
W75-06113

MICUCCI V. WHITE MOUNTAIN TRUST CO. (ACTION FOR DAMAGES AND RELIEF CAUSED BY RUNOFF FLOW FROM ADJACENT PROPERTY).
321 A.2d 573 (N.H. 1974).

Descriptors: *New Hampshire, *Judicial decisions, *Legal aspects, *Surface runoff, *Repulsion(Legal aspects), Snowmelt, Land tenure, Water management, Drainage systems, Natural flow, Construction, Flood damage, Water law, Reasonable use, Adjacent landowners, Adjudication procedure, Surface drainage.
Identifiers: *Common enemy rule, Injunctive relief, Liability(Legal aspects), Nuisance(Legal aspects), Proximate causation.

Action was brought for injunctive relief and damages caused by surface runoff from an adjacent landowner's property. The Supreme Court of New Hampshire held that the owner paved its lot in an unreasonable manner, even though the land had been previously covered by a building. A property owner may use, manage or control diffused surface waters on his land in any manner so long as it is reasonable in view of his own interest and that of all other persons adversely affected. The owner's alteration of natural and existing runoff patterns is a factor to be considered along with the nature of his use of the land, the foreseeability of harm to adjacent property, and the amount of resulting injury in arriving at a determination of whether it is reasonable. The court upheld, as being supported by the evidence, an award of fourteen hundred dollars for construction of a drainage system to divert flooding. The case was remanded, however, for determination of whether the three thousand dollar damage award should be reduced because the defendant was not solely responsible for all of the damage to plaintiff's property. (Sperling-Florida)
W75-06141

STATE OF OHIO V. REPUBLIC STEEL CORP (ACTION FOR POLLUTION OF WATERS WITHOUT A VALID PERMIT).
311 N.E.2d 911 (Ohio Mun. Ct. 1973).

Descriptors: *Discharge(Water), *Ohio, *Water pollution control, *Industrial wastes, *Judicial decisions, Permits, Federal Water Pollution Control Act, Legislation, Water law, Waste water disposal, Federal government, Legal aspects, Navigable waters, State governments, State jurisdiction, Regulation, Control, Rivers, Streams, Governmental interrelations, Federal-State water rights conflicts.
Identifiers: National Pollution Discharge Elimination System, FWPCA Amendments of 1972, Refuse Act of 1899, Administrative regulations, Environmental policy, State policy.

The State of Ohio charged a steel company with polluting the waters of Nimishillen Creek without a valid and unexpired permit. Such a permit is required by state law. The court held that the national discharge permit system established by the Federal Water Pollution Control Act Amendments of 1972 was not intended to preempt the authority of the state to issue permits for discharge into navigable waters within the state. The state had interim authority to establish a permit system. The corporation's pending application for a federal permit under the Refuse Act of 1899 did not obviate the necessity of a state permit. To deny Ohio the authority to control the discharge of pollutants in its water while a comprehensive program was being established under the 1972 Amendments would obviate the granting of interim authority to the states to issue permits for discharges of industrial waste within their jurisdiction. (Sperling-Florida)
W75-06142

LLOYD HARBOR STUDY GROUP, INC. V. DIAMOND (ACTION CHALLENGING DETERMINATION THAT WATER QUALITY STANDARDS WOULD NOT BE CONTRAVENED BY CONSTRUCTION OF NUCLEAR POWER PLANT).
355 N.Y.S.2d 693 (N.Y. S. Ct. 1973).

Descriptors: *New York, *Judicial decisions, *Water quality standards, *Administration, *Thermal pollution, Federal Water Pollution Control Act, Water law, Administrative agencies, Legal aspects, Nuclear power plants, Water pollution, Thermal water, Heated water, Adjudication procedure, Water pollution control, Water pollution sources, Water pollution effects, Water quality control, State governments.
Identifiers: *Certification, Declaratory judgments, Private interest groups, Environmental policy.

Various environmental groups and individuals brought action challenging the determination of the New York State Commissioner of Environmental Conservation, respondent, that applicable water quality standards would not be contravened by the proposed construction and operation of a nuclear generating station. Prior to the ruling, a public hearing was conducted at which some of the environmental effects of the project were considered. However, radiological effects, including related water quality standards were not considered. The petitioners sought to have the determination nullified on the grounds that the respondent exceeded his authority and that the determination was arbitrary, capricious, and an abuse of discretion. They also contended that because the state's water quality standards which insofar as they related to thermal pollution, had not been approved by the Environmental Protection Agency, there was no lawful bases for the determination. A New York Supreme Court ruled that the respondent had authority to issue the determination and, because the respondent was not required to hold the hearing at all, his failure to adopt the findings of the hearing officer was not arbitrary, capricious, or an abuse of discretion. Recognizing that such hearings are nothing more than a 'pro forma ritual and a hollow exercise', the court stated that it was the responsibility of the legislature, not the courts, to fill this void. (Deckert-Florida)
W75-06143

ARMSTRONG CHEMCON, INC. V. POLLUTION CONTROL BOARD (APPEAL OF BOARD'S ACTION LIMITING DISCHARGES OF MERCURY INTO WATERS).
310 N.E.2d 648 (Ill. App. 1974).

Descriptors: *Judicial decisions, Water pollution, *Water pollution sources, *Regulation, Effluents, *Illinois, Water quality control, Waste treatment, Sewage treatment, Waste water(Pollution), *Mercury, Public health, Water resources development, Water law, Economic aspects, Adjudication procedure, Waste water disposal, Water quality standards, Administrative decisions.

Proceeding stems from a petition by a group of manufacturers and suppliers seeking judicial review of the validity and application of the Illinois Pollution Control Board's regulation limiting discharges of mercury into Illinois waters. The petitions urge that the regulation is not warranted and will adversely affect their business. They also contend that the Board does not possess the power to regulate discharges into sewers. The court cites the purpose of the regulation is to restore, maintain, and enhance the purity of state waters in order to protect the health, welfare, property and the quality of life. The regulations also seek to assure that no contaminants are discharged into the waters without being given the degree of treatment or control necessary to prevent pollution. Based upon these purposes, the court held that the Board has the power to regulate the discharge of contaminants and the discharges into sewers. (Proctor-Florida)
W75-06144

NATURAL RESOURCES--CONSERVATION RESTRICTIONS.
Minnesota Sess. Laws, Vol 4, Ch. 531, H.F. No. 3129, p 1024-1025, approved April 11, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *State governments, *Scenic easements, *Preservation, Land tenure, Legal aspects, Land management, Resources development, Land use, Conservation, Natural resources, Water conservation, Real property, Protection, Easements, Ecology, Administration, Water policy, Water law, Public rights, Public access, Public lands, Eminent domain, Wildlife conservation, Environmental control.
Identifiers: Environmental policy.

The commissioner of natural resources is authorized to acquire by gift, purchase or exchange, conservation restrictions in the name of the state of Minnesota with funds specifically made available for that purpose. 'Conservation restriction' is defined as any right, whether or not stated in the form of a restriction, easement, covenant or condition, in any deed or other valid instrument, appropriate to retaining land or water areas predominantly in their natural state or as suitable habitat for fish or wildlife. No such restriction held by the commissioner shall be unenforceable on account of lack of privity of estate or contract or lack of benefit to particular land. Such restrictions shall be duly registered, shall be enforceable by injunction, and shall entitle the holder to enter the land in a reasonable manner to assure compliance. Said restrictions may be released by the holder in the same manner as any other interest in land, subject to conditions, if any imposed at the time of creation of the restriction. No provision of this statute shall render unenforceable any restriction not having the benefit of this statute. (Deckert-Florida)
W75-06145

LOWER ST. LOUIS RIVER BASIN--SANITARY SEWERS (AS AMENDED).
Minnesota Sess. Laws, Vol 4, Ch. 377, H.F. No. 3473, p 612-616, approved April 9, 1974 (1974).

Descriptors: *Minnesota, *Legislation, *Water pollution control, *Waste disposal, *Sewage disposal, Water law, Planning, Waste water(Pollution), Waste water disposal, Water quality control, Environmental control, Abatement, Water pollution, Water policy, State governments, Local governments, Governmental interrelations, Regulation, Administration, Jurisdiction, Legal aspects, Sewage districts, Sewage treatment, Administrative agencies.
Identifiers: Environmental policy, State policy, Effluent limitations.

There is hereby established a sanitary board with jurisdiction in the Western Lake Superior Sanitary District to provide for the prevention, control, and abatement of water pollution and the disposal of sewage and solid waste in the lower St. Louis River basin area. The board is a public corporation and a political subdivision of the state of Minnesota and is responsible for carrying on a long range planning program with respect to water pollution control and waste disposal. It has authority to take over, acquire, construct, and operate all interceptors and treatment works needed for the disposal of sewage and solid waste, as well as local sanitary sewer facilities over which the board agrees to assume responsibility at the request of any local government unit. The board may construct, operate, and regulate solid waste disposal sites and facilities, may establish a system of user charges, may issue general obligation certificates of indebtedness and general obligation bonds, and may levy property taxes for debt service of the district disposal system. An annual budget shall be prepared and adopted by the board prior to September 1, 1972, and each year thereafter. (Deckert-Florida)
W75-06146

SEVENTEEN, INC. V. PILOT LIFE INSURANCE CO. (ACTION FOR INJUNCTION TO RESTRAIN DIVERSION OF SURFACE WATERS).
205 S.E.2d 648 (Va. 1974).

Descriptors: *Judicial decisions, *Surface runoff, *Ditches, *Easements, Drainage, Drainage engineering, Land use, *Virginia, Trespass, Legal aspects, Public rights, Water law, Land development, Public utilities, Public benefits, Social aspects, Land tenure, Adjudication procedure.
Identifiers: *Injunctive relief.

The action before the Supreme Court of Virginia was for injunction to restrain defendants from diverting surface water into a drainage ditch extending across plaintiffs property. Defendants are the City of Chesapeake, a life insurance company, and the State Highway Commissioner. Plaintiffs, local landowners, filed their bill for injunction following the replacement of drainage pipes to accommodate an increased volume of water across their land, thus increasing the easement. Plaintiffs allege that the increased volume of water would cause irreparable damage to their property and unlawfully increase the burden of the drainage easement. The appellate court reversed the trial court holding that the plaintiff must have an opportunity to present its case on the merits. If plaintiffs' allegations are true, an injunction may issue. An injunction is not a remedy in every case of nuisance or continuing trespass. In determining the relief to be granted the chancellor must balance the interests of the parties and of the public. (Proctor-Florida)
W75-06147

MOULTON V. GROVETON PAPERS CO. (ACTION FOR PROPERTY DAMAGES RESULTING FROM FAILURE OF DAM OWNED BY DEFENDANT, RESULTING IN DOWNSTREAM FLOODING OF PLAINTIFF'S PROPERTY).
323 A.2d 906 (N.H. 1974).

Descriptors: *Dam failure, *Flood, *Damages, *Judicial decisions, *Cost allocation, Flood damages, *New Hampshire, Land resources, Property values, Bridges, Streams, Real property, Value, Water law, Water resources development, Bridge failure, Adjudication procedure, Cost repayment, Local governments, Negligence, Legal aspects, Cost analysis, Economics, Evaluation.
Identifiers: Liability(Legal aspects).

Action was brought before the Supreme Court of New Hampshire for property damage resulting from the failure of a dam owned by the defendants. As a result of the failure and the ensuing flood, plaintiffs' properties were inundated. The plaintiff, a Vermont town, alleges that it has the sole obligation to replace the damaged bridges. This obligation gives it a property interest in those structures and a resulting right to recover damages for the cost of repairs made necessary by the negligence of the tort-feasor. Defendants urged that recovery be limited to the extent that the town would not be compensated by the state government for the damages and cost of repairs. The court agreed and limited plaintiff's recovery to the unmitigated portion of its damages. The court also held that landowners whose property was damaged by flooding could recover restoration costs if their properties could be restored without incurring a cost disproportionate to the actual injury. If such restoration was found impracticable, the difference between the value of the property before and after the injury would be the measure of damages. (Proctor-Florida)
W75-06148

LE COMPTE V. STATE (NEW JERSEY) (ACTION SEEKING DECLARATORY JUDGMENT BY PLAINTIFF, APPLICANT FOR PURCHASE OF TIDELANDS CHALLENGING USE AND OCCUPANCY RESTRICTIONS IMPOSED BY NATURAL RESOURCE COUNCIL).
323 A.2d 481 (New Jersey 1974).

Descriptors: *Riparian rights, *Riparian land, *Navigable waters, *Wetlands, Legal aspects, Water law, Water rights, Trespass, Judicial decisions, Remedies, Relative rights, Water resources development, *New Jersey, Administrative agencies, Adjudication procedure, Administrative decisions, Tidal marshes, Water management(Applied), Legal reviews, Compensation, Assessments.

Identifiers: Declaratory judgment, Coastal zone management, State policy, Administrative regulations.

Plaintiff submitted several applications to the Natural Resource Council (NRC) of the Department of Environmental Protection to purchase certain parcels of riparian land from the State of New Jersey. The applications were filed after the plaintiff had occupied the land in question. The NRC gave tentative approval to plaintiff's application, fixed the compensation to be paid, and in addition, imposed on each lot a use and occupancy assessment for the prior use which plaintiff was required to pay before the State would convey title. Plaintiff instituted this declaratory judgment action to test the validity of these assessments. The only issue for determination was whether the NRC could require a use and occupancy assessment in addition to the bargained-for consideration paid for the purchase of riparian lands. The court held that the NRC had no reason to superimpose the assessment as a separate charge. The NRC does have power to fix a total purchase price including both reasonable value and proper compensation for use and occupancy during the prior period of trespass, since the latter is an element of the total consideration. (Proctor-Florida)
W75-06149

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
496 F.2d 1017 (5th Cir. 1974).

Descriptors: *Judicial decisions, *Environmental effects, *Highway effects, *Regulation, Road construction, Governments, Jurisdiction, Highways, *Texas, Road construction, Financing, Economics, Allotments, Capital, Legal aspects, State governments, Rivers and Harbors Act, Economic aspects, Governmental interrelations, Administrative agencies.
Identifiers: Injunctive relief, State policy, National Environmental Policy Act, Environmental impact statement.

Action was brought by members of a conservation society against the Texas Highway Department and the Federal Department of Transportation to enjoin construction of an expressway which would pass through parklands in the city of San Antonio, Texas. The question for decision was whether the Congressional enactment of the Federal-Aid Highway Act of 1973, severing all federal connection with the expressway in question, eliminates the necessity of compliance with provisions of the National Environmental Policy Act (NEPA). Plaintiffs contend that the State Highway Department must obtain approval from the Army Corps of Engineers for the expressway to cross the San Antonio River and the Olmos Dam and Reservoir area. The reason for this position is the fact that the highway is under federal jurisdiction thus invoking the provisions of the NEPA. The court rejected plaintiffs argument and held that the facts showed the project to be financed with nonfederal funds and to serve local needs and concluded that no environmental impact statement was therefore needed. (Proctor-Florida)
W75-06150

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
373 F. Supp. 991 (D. Colo. 1974).

Descriptors: *Nuclear powerplants, *Nuclear wastes, *Regulations, *Judicial decisions, Disposal, Nuclear engineering, Radioactive wastes, Radioactive waste disposal, Water pollution, Waste treatment, Jurisdiction, Water law, Water resources development, Interagency cooperation, Adjudication procedure, Federal Water Pollution Control Act, *Colorado.
Identifiers: FWPCA Amendments of 1972, Administrative regulations.

The case involves plaintiff's challenge of the accord adopted by the Atomic Energy Commission (AEC) and the Environmental Protection Agency (EPA) regarding the interaction of the Federal Water Pollution Control Act and the Atomic Energy Act. Plaintiffs want the EPA to regulate the discharge of byproduct materials, source materials, and special nuclear materials from a privately owned nuclear electrical generating plant and from a federally owned plant. The EPA and AEC maintain that the regulation of the discharge of these particular materials is under the exclusive jurisdiction of the AEC and not the EPA. The issue before the court is whether all radioactive effluents are subject to regulation pursuant to the Federal Water Pollution Control Act. The Court held that the AEC possesses the sole authority to regulate radiation hazards associated with by-product, source, and special nuclear materials and with production and utilization facilities. (Proctor-Florida).
W75-06151

THE STATE OF TEXAS, ET AL. V. FRI (CHALLENGE OF EXECUTIVE IMPOUNDMENT OF FWPCA FUNDS),
For primary bibliographic entry see Field 5G.
W75-06152

AMERAPORT DEEP DRAFT HARBOR AND TERMINAL COMPACT,
Code of Alabama, Vol. 9, Title 38, Ch. 10, sec 156, p 369-371 (Supp 1973).

Descriptors: *Interstate compacts, *Harbors, *Alabama, *Legislation, *Adoption of practices, Mississippi, Continental shelf, United States, Administrative agencies, Administration, Local governments, State government, Government finance, Research, Planning, Comprehensive planning, Water resources development, Port authorities.
Identifiers: Administrative regulations, Coastal zone management.

The governor of Alabama is authorized to execute an interstate compact to promote the development of a deep draft harbor and terminal to be located on the continental shelf of the United States. The states that are parties to this compact established a joint agency known as the Ameraport Deep Draft Harbor and Terminal Authority. The membership of the authority consists of the governor and five other citizens of each party state to be appointed by the governor. The Authority has power to hold hearings, and conduct studies and surveys of problems, benefits and other matters pertaining to the development of the facility. The Authority will cooperate with other public or private groups, whether local, state, regional, or national, having an interest in the development of deep draft harbors. It will also formulate and execute plans and policies for emphasizing the purpose of this compact before the Congress and other appropriate offices and agencies of the United States. (Sperling-Florida)
W75-06153

AMERAPORT OFFSHORE HARBOR AND TERMINAL COMMISSION,
Code of Alabama, Vol 9, Title 38, Ch 11, secs. 157-182, p 371-376, (Supp 1973).

Descriptors: *Alabama, *Legislation, *State governments, *Offshore platforms, *Coastal structures, Administrative agencies, Resources development, Governmental interrelations, Planning, Ecology, Environment, Environmental effects, Transportation, Water law, Legal aspects, Water policy, Control, Facilities, Harbors, Coasts, Gulf of Mexico, Foreign trade, Economics, Water pollution control, Shore protection, Jurisdiction, Port authorities, Water resources development.
Identifiers: Coastal waters, State policy, Contiguous zone, Territorial seas(Jurisdiction), Coastal zone management, Environmental policy, Water rights(Non-riparians).

The Ameraport Offshore Harbor and Terminal Commission is created to plan, develop, and operate a deep draft harbor and terminal facility for the docking, loading and unloading of vessels carrying liquid or dry bulk and energy cargoes. The Commission is charged with asserting and protecting Alabama's economic, social, and environmental interests in the development of any such facility outside the state where such development may have an impact upon the state. The Commission shall be composed of the Governor, as an ex officio member, and five other members, appointed by the Governor to serve staggered five-year terms. An Executive Director shall be appointed by the Commission to manage the executive and administrative functions and operations of the Commission. The Commission is vested with exclusive and plenary authority to do any and all things necessary or proper to carry out its purpose, including the power to acquire property, enter into contracts, and issue bonds. This Commission shall cease to exist upon the authorization of a bi-state compact by the U.S Congress for essentially the same purposes of this chapter. (Deckert-Florida)
W75-06154

STATE V. REED (ACTION BY STATE TO PREVENT CONSTRUCTION OF DRIVE-WAY THRU WETLANDS, A VIOLATION OF STATUTE),
359 N.Y.S. 2nd 185 (So. Ct. 1974).

Descriptors: *New York, *Judicial decisions, *Law enforcement, *Wetlands, *Preservation, Legislation, Water law, Legal aspects, Marshes, Conservation, Administrative agencies, State jurisdiction, State governments, Permits, Administration, Regulation, Land tenure, Land development, Land management, Management, Land use, Non-structural alternatives, Zoning, Urbanization, Constitutional law, Adjudication procedure.
Identifiers: Coastal zone management, Environmental policy.

The state of New York brought this action to prevent the defendant landowners from constructing a driveway through certain wetlands in Suffolk County. The state alleged that said construction would violate certain provisions of the state Environmental Conservation Law (ECL) which prohibited the altering of any tidal wetland without a permit from the Department of Conservation. In addition to their general denial, the defendants contended that the statue did not apply to wetlands in Suffolk County; that the state was not a proper party; that the provisions of the ECL were unconstitutional as confiscatory; that the state possessed the power of eminent domain and could condemn the property; and that the complaint failed to state a cause of action. A Supreme Court of New York, in a memorandum opinion, rejected the defendants affirmative defenses and held that the statue applied to all tidal wetlands and lands immediately adjacent thereto which the commissioner deems necessary to preserve prior to the effective data of land-use regulations to be adopted by the commissioner. The court further held that the defendants must avail themselves of the procedures set forth in the ECL before they may challenge its constitutionality. (Deckert-Florida)
W75-06155

LICENSES--MOTOR VEHICLE--SUSPENSION FOR DUMPING,
Massachusetts Session Laws, No 1, Ch 39, p 21-22, approved March 15, 1974 (1974).

Descriptors: *Massachusetts, *Legislation, *Water quality control, *Water pollution, *Law enforcement, Water law, Legal aspects, Pollution sources, Administration, Adoption of practices, Local governments, Penalties(Legal), Assessments, Licenses, State governments, Pollution abatement, Disposal, Permits, Regulation.
Identifiers: State policy, Coastal zone management, Non-point sources(Pollution).

The Massachusetts registrar of motor vehicles is authorized to suspend an operator's license or the owner's certificate of registration for using a motor vehicle for certain dumping. Dumping is prohibited in or upon coastal or inland waters or within twenty yards of any such water. If a motor vehicle is used in the dumping, a conviction should be reported by the court to the registrar of motor vehicles. The registrar may suspend the license of the operator of the vehicle for not more than thirty days, and if the person so convicted is the owner of the vehicle its certificate of registration may be suspended for a like period. This section is not applicable to any dumping ground approved by an appropriate public authority. This law will be enforced by natural resources officers, by harbormasters, state police and inspectors of motor vehicles. In Boston there will be additional enforcers, the commissioners of health, housing inspection, and public works. (Sperling-Florida)
W75-06156

STATE OF VERMONT V. STATE OF NEW YORK (ACTION TO ABATE POLLUTION OF INTERSTATE WATERS--CONSENTDECREE),
94 S. Ct 2248 (1974).

Descriptors: *Vermont, *Enforcement, *Judicial decisions, *Adjudication procedure, Water pollution, Water pollution sources, Pollution abatement, Lakes, *New York, Negotiations, Legal aspects, Water resources development, Water law, Effluents, Pollutants, Adoption of practices, Economic aspects, Administration, State governments, Governmental interrelations, cost allocation, Cost sharing.
Identifiers: *Nuisance(Legal aspects), *State policy.

The State of Vermont filed a complaint against the State of New York and the International Paper Company alleging that as a result of the discharge of waste from the paper company's mills, both the company and the state were responsible for the accumulation of sludge beds in Lake Champlain. The plaintiff alleged that the pollution caused by the discharges constituted a public nuisance. The special master presented a proposed consent decree to settle the action to the Supreme Court of the United States. The Supreme Court refused to approve the proposed decree insofar as it provided for the appointment of a lake master who would police the execution of the settlement, and who would pass onto the Court his proposed resolution of the contested issues. The Court held that the proposed resolution of disputes might have no relation to the Court's performance of its judicial power set forth in the Constitution. (Proctor-Florida)
W75-06157

KIRKLAND V. HARDWICKE CHEMICAL CO. (ACTION FOR POLLUTION OF STREAM),
205 S.E. 2nd 831 (S.C. 1974).

Descriptors: *South Carolina, *Water pollution effects, *Legal aspects, *Judicial decisions, Water pollution, Water pollution sources, Negligence, Hazards, Public health, Water law, Fishkill, Effluents, Industrial wastes, Adjudication procedure, Oily water, Riparian land.
Identifiers: *Proximate causation, Evidence, Liability(Legal aspects).

Action was brought by landowner and tenant against a chemical company for pollution of a stream which bisected the landowner's property. The Common Pleas Court entered judgment in favor of the landowner and tenant, and the chemical company appealed. The appellant contended that the respondents failed to prove that appellant's operation was the proximate cause of their damages. A biological consultant with the South Carolina Pollution Control Authority testified that five and nine months prior to the two fish kills the water in question contained sufficient pollution to kill fish. The Supreme Court of South Carolina held that, in view of testimony that there was no pollution in the stream six months after the second fish kill, the consultant's testimony and other evidence at trial were insufficient to demonstrate negligence of the appellant. The judgment was reversed. (Proctor-Florida)
W75-06158

FIVE MILE RIVER COMMISSION,
Connecticut General Statute Annotated, Title 15, Ch 263, sec. 15-26a, p 15 (Supp 1972).

Descriptors: *Connecticut, *Legislation, *River regulation, *Local governments, *Administrative agencies, Navigation, Governmental interrelations, Rivers, Legal aspects, Water law, Jurisdiction, Watersheds(Basins), River basins, Watershed management, Administration, Harbors, Water quality, Conservation, Water resources development, Water rights, Water utilization, Law enforcement, Non-structural alternatives, Water pollution control, Water policy.
Identifiers: State policy, Coastal zone management, Environmental policy, Water rights(Non-riparians).

There shall be a Five Mile River commission consisting of two electors from each of the towns of Norwalk and Darient. Upon nomination by the legislative bodies of said towns, the members shall be appointed by the Governor for four year terms. The commission shall have regulatory jurisdiction over the use of the Five Mile River and shall concern itself with the navigation, pollution, and conservation of said river and its drainage basin. Said commission shall propose for ratification by the respective legislative bodies such regulations and procedures as it deems necessary for the control of moorings and navigation. The commission shall be responsible for reporting to the appropriate agency all violations of federal, state, or local law brought to its notice which in any way affect the river. The commission shall also appoint a harbor superintendent, with such powers as the commission shall delegate. The superintendent may receive a salary, established and paid by the member town, and the commission may contract for such professional and clerical services as may be necessary to carry out its function. The town of New Canaan may, at any time, become a member of the commission with two electors appointed in the same manner as the existing members. (Deckert-Florida)
W75-06159

PUBLIC WROKS--COUNTIES--EROSION CONTROL (AS AMENDED),
Michigan Legal Service, Vol 3, Public Act No 200, H.B. 5468, p 470-476, approved July 9, 1974, effective immediately (1974).

Descriptors: *Michigan, *Legislation, *Administration agencies, *Erosion control, *Water supply, *Waste water disposal, Government finance, Adoption of practices, Legal aspects, Water requirements, Budget, Economic aspects, State governments, Waste water treatment, Lakes, Water distribution(Applied), Water supply development, Water resources development.
Identifiers: *State policy, *Environmental policy, *Administrative regulations.

In Michigan, a county board of commissioners in a resolution passed by a two thirds vote of its members may establish a department of public works. The legislation also provides for the method of appointment and tenure of members of the department. The county board will provide each year in its annual budget for the expenses of the department of public works. The department of public works has power to acquire a water supply system, a sewage disposal system, a refuse system, an erosion control system, and to make lake improvements, as well as to improve, enlarge, extend, operate, and maintain the improvements. A county operating under this legislation may acquire outside its corporate limits any part of a water supply system which is necessary to secure a source of supply. A county can also acquire parts of a sewage or refuse system. The acquisition of a water supply, sewage disposal or refuse system, or the improvement of an erosion control system may be financed by the issuance of revenue bonds. (Sperling-Florida)
W75-06160

DEFINING FRESHWATER WETLANDS,
Massachusetts Univ., Amherst.
For primary bibliographic entry see Field 4A.
W75-06161

WATERS AND WATERCOURSES--PUBLIC TRUST DOCTRINE--AN ORDINANCE PROVIDING A RESIDENCY--DIFFERENTIATED FEE SCHEDULE FOR USE OF A MUNICIPAL BEACH IS INVALID AS A VIOLATION OF THE PUBLIC TRUST DOCTRINE,
University of Cincinnati Law Review, Vol 42, No 3, p 554-563, 1973. 69 ref.

Descriptors: *Water allocation(Policy), *Recreation, *State governments, *Local governments, *Government finance, Judicial decisions, Economic aspects, Legal aspects, Ordinance, Legislation, Water resources, Social aspects, Land tenure, Public welfare, Oceans, Tidal wetlands, Riparian rights, Water law, Land management, Conservation, Water policy, *New Jersey.
Identifiers: Public trust doctrine, Coastal zone, Coastal zone management, State policy, Rights(Non-riparian).

In 1970 a New Jersey municipality enacted an ordinance requiring non-residents to pay higher beach user fees than residents. This was passed pursuant to a state statute permitting such fees. This ordinance providing for fee differentiation based upon residency was challenged by an adjacent inland municipality. Plaintiffs contended the different fee schedules were violative of the Equal Protection Clause, and that they also abrogated the common law right of public access to the ocean. The Supreme Court of New Jersey reversed the Appellate Division which found no fourteenth amendment violation. The Supreme Court, though, reversed on a different ground. It held that the fee differentiation for beach use based on residency is invalid as a violation of the public trust doctrine. Under this doctrine the state is required to administer tidelands for the benefit of the public. The public trust doctrine as viewed by the court entailed a proscription against the alienation of state-owned, tidal lands, and a dictation of the uses of this land to which the public is entitled. Recreational beach activities are within the class of protected public uses. (Sperling-Florida)
W75-06162

A 50 MILE FISHERIES ZONE FOR OREGON,
Oregon Univ., Eugene. School of Law.
J. L. Jacobson.
Ocean Law Memo, December 10, 1973, 4 p.

Descriptors: *Oregon, *Legislation, *Commercial fishing, *Regulation, *State jurisdiction, Water law, Legal aspects, International law, Jurisdiction, Law of the sea, International waters, Federal government, Constitutional law, Conservation,

Water resources development, Oceans, Fish management, Fish conservation, Governments, Law enforcement, Non-structural alternatives, Water policy, Water rights, Fishing, Marine fisheries, Governmental Interrelations.
Identifiers: Coastal waters, Territorial seas(Jurisdiction), International agreements.

The Oregon Legislature recently passed an act which would have established a 50-mile exclusive fishing zone off the Oregon coast. The act was vetoed by the governor, but had it become law it would have created a 'state' fisheries zone. The validity of such an action in light of the U.S Constitution and internal law is examined. Under current trends in international law, the federal government may be able to extend the exclusive fisheries zone beyond the current 12-mile limit. On the other hand, U.S. constitutional law, while allowing a state to regulate its own citizens beyond its territorial borders, limits a state's regulatory jurisdiction to within the 3-mile territorial limit. Considering the enforcement difficulties experienced by the federal government with its 12-mile boundary it is unlikely that a state could effectively enforce an even broader zone. Attempts by states to establish such zones do attract attention to the need for greater protection of the sea's resources. The upcoming U.N.- sponsored international conference on the Law of the Sea is expected to produce the international cooperation needed to protect the ocean's all-too-limited living resources. (Deckert-Florida)
W75-06163

DEEP-WELL INJECTION: FUTURE PANACEA FOR WASTES DISPOSAL,
For primary bibliographic entry see Field 5B.
W75-06164

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
R. A. Carpenter.
Technology Review, Vol 74, No 3, p 58-63, January 1972. 2 photo.

Descriptors: *Legislation, *Federal government, Environment, *Planning, *Natural resources, Water policy, Water law, Ecology, Political aspects, Water resources development, Legal aspects, Institutional constraints, Competing uses, Federal project policy, Non-structural alternatives, Project purposes conservation, Exploitation, Productivity, Environmental effects, Evaluation, Value, Analysis.
Identifiers: *Environmental Policy, National Environmental Policy Act, Refuse Act of 1899, FWPCA Amendments of 1972.

The historical goals of the United States, such as growth, wealth, and consumption, are being challenged by those of the new 'zero' school--zero population growth, zero economic growth, and zero technological change. These historical goals have never been as simplistically exploited as we now think; our laws demonstrate a continuing quest for balance and for optimum resolution between resources and needs. Examination of examples of this country's social legislation, such as the National Park Service Act of 1916 and the Environmental Policy Act of 1969, reveals a consistent desire to 'conserve' and yet 'enjoy' natural resources. This goal is one of 'productive harmony', a framework within which relative values are continually reassessed as science and technology advances. Only by developing and maintaining a social conscience which considers ecological information, can we hope to achieve the maximum productivity we seek. In a democracy, this ethic of environmental quality is the only ultimate basis for progress. (Deckert-Florida)
W75-06165

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 4B.
W75-06166

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

AN ANALYTICAL APPROACH TO REORGANIZATION OF WATER MANAGEMENT SYSTEMS,
Pennsylvania State Univ., University Park. Inst. for Research on Land and Water Resources.
For primary bibliographic entry see Field 6B.
W75-06193

THE ROLE OF CITIZEN ADVISORY GROUPS IN WATER RESOURCES PLANNING,
Massachusetts Univ., Amherst. Dept. of Political Science.
For primary bibliographic entry see Field 6B.
W75-06198

WATER RESOURCES DEVELOPMENT IN CENTRAL AMERICA, 1970 TO 1980,
Economic Commission for Latin America (UN), Mexico City.
For primary bibliographic entry see Field 4A.
W75-06270

OBSTACLES TO TAMING CORPORATE POLLUTERS: WATER POLLUTION POLITICS IN GARY, INDIANA,
Hampshire Coll., Amherst, Mass. Dept. of Political Science.
For primary bibliographic entry see Field 5G.
W75-06322

6F. Nonstructural Alternatives

FLOOD MANAGEMENT IN DEVELOPING COUNTRIES,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
M. M. Dandekar.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 375-383. (1973) 1 fig, 4 ref.

Descriptors: *Floods, *Watershed management, *Political aspects, Legislation, Warning systems, Flood plains, Management, River basin development, Training, Institutions.
Identifiers: *India, Developing countries.

The problem of flood management is a socio-economic as well as an engineering problem. It becomes highly complex, particularly in developing countries, due to various reasons. Special features of flood management problems in the developing countries with special reference to India were identified. It was concluded that the following initial steps are necessary as a correct approach towards satisfactory flood management programs in the developing countries: (1) establish the proper level of priority for flood management by a new methodology of evaluation of social goals and objectives; (2) adequately represent engineers and economists in the flood control policy making bodies; (3) develop crash program for the collection of all relevant data; (4) evolve a national water data policy with special stress on data retrieval; (5) facilitate quick change-over to computer methods; (6) enact legislation regarding various aspects of the water resources, particularly flood plain regulations; and (7) train local administration for flood relief operations. (See also W75-05973) (Humphreys-ISWS)
W75-06002

FLOOD WARNING THROUGH A HYDROLOGICAL-CUM-MATHEMATICAL MODEL AND VHF TELEMETRY,
Irrigation and Power Research Station, Poondi (India).
For primary bibliographic entry see Field 4A.
W75-06004

SURVEY AND ANALYSIS OF URBAN DRAINAGE ORDINANCES AND A RECOMMENDED MODEL ORDINANCE,
Georgia Inst. of Technology, Atlanta. School of Civil Engineering.
T. N. Debo.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-240 817, $8.75 in paper copy, $2.25 in microfiche. Georgia Environmental Resources Center, Atlanta, Report No. ERC-0475, February 1975. 294 p, 5 fig, 42 ref, 5 append.

Descriptors: *Drainage programs, Drainage systems, Flood control, Urban runoff, *Nonstructural alternatives, Virginia, *Urban drainage, Storm water, Storage, *Legislation, Georgia, Illinois, Sediment control, *Flood plain zoning, Model studies, Erosion control, Florida, Michigan.
Identifiers: Atlanta(Geo), Fairfax County(Va), Chicago(Ill), Ingham County(Mich), Tampa(Fla).

At a time when many communities have adopted ordinances to regulate land development and land use practices that aggravate flood and drainage problems, a sound ordinance requires information on the effectiveness of specific provisions and the problems in administering them. In compiling such information, the drainage programs were intensively studied for the Atlanta Metropolitan Area (City of Atlanta, DeKalb, Fulton, and Clayton Counties); Chicago, Illinois (Chicago Sanitary District); Fairfax County, Virginia; Ingham County, Michigan; and Tampa, Florida. The study included review of all available publications, interviews with a review of the files of the personnel involved in the local drainage program (both from within the outside the governmental structure), review of the local ordinances, and any other available documentation on the drainage program. The resulting written case studies were reviewed by several persons from each community to validate the accuracy of the material presented and used as a data base for developing a model ordinance. The model ordinance is documented by commentaries on why each provision is included and is intended to guide in the drafting of drainage ordinances for specific areas and not to be adopted verbatim without prior review of conditions. In addition, the use of technical information in drainage and erosion control ordinances was investigated, the use of hydrologic computer simulation in an urban drainage program was documented, and the problems associated with achieving community objectives through urban drainage ordinances were discussed. (James-GeoTech)
W75-06076

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06110

THE CASE FOR FLOOD-PLAIN MAPPING IN AUSTRALIA,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
For primary bibliographic entry see Field 7C.
W75-06114

6G. Ecologic Impact Of Water Development

EFFECTS OF SEDIMENT ON WATER RESOURCE PLANNING,
Corps of Engineers, Omaha, Neb. Missouri River Div.
For primary bibliographic entry see Field 5C.
W75-06056

MANAGING WATER RESOURCE PROJECTS TO MAINTAIN ENVIRONMENTAL BENEFITS,
Bureau of Reclamation, Washington, D.C.
G. G. Stamm.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 31-39.

Descriptors: *Administration, *Adoption of practices, *Operation and maintenance, *Management, *Environmental effects, *Federal project policy, Operations, Water policy, Environmental engineering, Recreation facilities, Multiple purpose projects, Reclamation, Planning, Natural resources.
Identifiers: *Environmental preservation, *Water project management.

A great deal of opportunity exists for improving water project operations for environmental preservation and enhancement through developing resources for the benefit of the people. A key element for success is the reorientation of philosophies to recognize that retaining or restoring natural appearances, or the blending of man made works with nature, is a full-fledged objective in resource development and use. Reservoirs provide management with considerable opportunity to use imagination and ingenuity for environmental enhancement. Careful attention is given to maintaining optimum water levels within permissible operating levels during spring fish-spawn periods and waterfowl nesting seasons to enhance wildlife propagation. Sediment deposits in reservoir areas which may be uncovered and barren in periods of low water have been treated with vegetation plantings established for soil stabilization, to prevent dust from blowing, and for wildlife enhancement. For water distribution system management, pumping plants may be involved in delivering water into the distribution system, or in conveying water through the system. Means used to achieve improvements in water distribution are automation of the water systems to improve efficiencies, rehabilitation of older water systems to save water, enforcement of safety regulations, consideration of aesthetics reduction of operating costs, and adoption of modernized operational philosophies to foster improved recreational use. Thoughtful management of drainage systems is an important environmental consideration in intensively cultivated areas to improve aesthetics and reduce pollution, health and safety hazards. Responsibility for management's relationships with water users is shared by the industry, the public, and all levels of government. (Poertner)
W75-06066

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06067

A STUDY OF NATURAL WATER SYSTEMS IN WESTERN MONTANA,
Utah Univ., Salt Lake City. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06082

NATURAL RESOURCES--CONSERVATION RESTRICTIONS.
For primary bibliographic entry see Field 6E.
W75-06145

NAMED INDIVIDUAL MEMBERS OF THE SAN ANTONIO CONSERVATION SOCIETY, ET AL. V. THE TEXAS HIGHWAY DEPARTMENT (ACTION TO ENJOIN HIGHWAY CONSTRUCTION THROUGH PROTECTED LAND).
For primary bibliographic entry see Field 6E.
W75-06150

COLORADO PUBLIC INTEREST RESEARCH GROUP, INC. V. TRAIN (SUIT CHALLENGING ACCORD FOLLOWED BY EPA AND AEC TO CORRELATION OF THE FWPCA AND THE ATOMIC ENERGY ACT),
For primary bibliographic entry see Field 6E.
W75-06151

NATIONAL GOALS AND ENVIRONMENTAL LAWS,
Library of Congress, Washington, D.C. Congressional Research Service.
For primary bibliographic entry see Field 6E.
W75-06165

GEOTHERMAL LEASING PROGRAM, VOLUME 1, PROMULGATION OF LEASING AND OPERATING REGULATIONS (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Department of the Interior, Washington, D.C.
For primary bibliographic entry see Field 4B.
W75-06166

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 4A.
W75-06167

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
For primary bibliographic entry see Field 8A.
W75-06168

DREDGING OF LEWIS AND CLARK CONNECTING CHANNEL, CLATSOP COUNTY, OREGON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Portland, Oreg.
For primary bibliographic entry see Field 4A.
W75-06169

OPERATION AND MAINTENANCE PROGRAM, WISTER LAKE, POTEAU RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06170

NARGE CREEK PROJECT MEASURE, KENTUCKY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Lexington, Ky.
For primary bibliographic entry see Field 4A.
W75-06171

DEEP FORK LOG-JAM, DEEP FORK RIVER, OKLAHOMA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Tulsa, Okla.
For primary bibliographic entry see Field 4A.
W75-06172

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.
W75-06173

CONFINED DISPOSAL FACILITY, GRAND HAVEN HARBOR OTTAWA COUNTY, MICHIGAN (FINAL ENVIRONMENTAL IMPACT STATEMENT,
Army Engineer District, Detroit, Mich.
For primary bibliographic entry see Field 5G.
W75-06174

BUFFALO RIVER WATERSHED PROJECT, AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06175

MAINTENANCE DREDGING, PORT CHESTER HARBOR, NEW YORK (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, New York.
For primary bibliographic entry see Field 5G.
W75-06176

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

MAJOR DRAINAGE PROJECT, RIVERVIEW, VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-06178

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 8C.

W75-06179

BRICEVILLE FLOOD RELIEF PROJECT, TENNESSEE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Tennessee Valley Authority, Chattanooga.
For primary bibliographic entry see Field 4A.
W75-06180

CITY OF FLORENCE, SOUTH CAROLINA EXTENSION OF WATER AND SEWER SERVICE (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Economic Development Administration, Washington, D.C.
For primary bibliographic entry see Field 5D.
W75-06181

PROPOSED INCLUSION OF THE LITTLE MIAMI RIVER INTO THE NATIONAL WILD AND SCENIC RIVERS SYSTEM, OHIO, (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Bureau of Outdoor Recreation, Washington, D.C.
For primary bibliographic entry see Field 4D.
W75-06182

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

A LIMNOLOGICAL INVESTIGATION OF THE RELATIONSHIP BETWEEN THE NAVASOTA RIVER, TEXAS, AND A SELECTED FLOODPLAIN,
Texas A and M Univ., College Station. Dept. of Biology.
For primary bibliographic entry see Field 5B.
W75-06242

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
Available from National Technical Information Service, Springfield, Va. 22161 as Rept. No. UCRL-Trans-10701. Report UCRL-TRANS-10701. 1972, 240 p.

Descriptors: *Translations, *Nuclear energy, *Beneficial use, *Nuclear explosions, *Cost-benefit theory, *Channels, *Radioactivity, Cavitation, Tunnels, Underground, Air pollution, Water pollution, Soil contamination, Craters, Geophysics, Seismic waves, Dam construction, Activation energy, Economics, Design criteria.
Identifiers: *Peaceful uses of atomic energy, Austria.

English translations are presented of the French, Russian, and Spanish papers presented at the Third IAEP Panel on the Peaceful Uses of Nuclear Explsions held in Vienna, Austria, 27-30 November 1972. The numbers following the title in the Tables of Contents correspond to the numbers assigned to these papers by the IAEA in their Proceedings of the Panel. Translations of papers IAEA-PL/388-3/15, -3/16, and -3/28 were provided by the United Kingdom Atomic Energy Authority. The remainder of the translations was made by Addis Translations International of Woodside, California. (Houser-ORNL)
W75-06349

7. RESOURCES DATA

7A. Network Design

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
P. M. Fleming.
Journal of Hydrology (New Zealand), Vol 13, No 1, p 21-31, 1974. 23 ref.

Descriptors: Hydrology, *Basins, *Data collections, *Assessments, Sampling, Climatic zones, Arid lands, Streamflow, Climates, Precipitation(Atmospheric), Temperature, Humidity, Winds, Solar radiation, *Australia, Data processing, Specifications, Model studies.

The Australian representative basins program, its history, and the influence of the a priori conceptual model on the specifications for data collection and processing were discussed. The Australian representative basins program was initiated with two primary aims: (1) to classify and select from the whole range of hydrological diversity present in Australia, representative basins at a scale significant for water resource development; (2) to select an analysis technique adequate to deal with this diversity, and then ensure that a uniform and appropriate data collection specification was applied to all basins. (Dawes-ISWS)
W75-05953

DESIGN AND ASSEMBLY OF AN AUTOMATIC HYDROLOGIC DATA ACQUISITION SYSTEM,
Massachusetts Univ., Amherst. Water Resources Research Center.
P. N. Turbide, J. M. Colonell, and F. A. Hill.
Available from W.R.R.C., UMass at Amherst for $3.00. Also available from the National Technical Information Service, Springfield, Va 22161 as PB-240 893, $5.75 in paper copy, $2.25 in microfiche. Water Resources Research Center Publication No 44--Special Report, June 1974. 121 p, 50 fig, 29 tab, 4 ref, 2 append. OWRT B-021-MASS(1).

Descriptors: *Hydrologic data, *Design, Automation, *Data processing, Data storage and retrieval, Fabrication, Operations, Data collections.
Identifiers: *Data acquisition system.

The design, fabrication, assembly, and operation are described of an Automatic Hydrologic Data Acquisition System. This system will record the output of eight analogs and eight digital sensors at sample intervals from 30 seconds to four hours. The data are punched on paper tape which is coded in ASC11 format, and is compatible with most teletype input computer systems. A feature of this system is a battery-operated digital electronic clock which can be used as a time reference during the data sampling.
W75-06197

THE REDESIGN OF THE RAINGAUGE NETWORK OF ZAMBIA,
Hydrometeorologicky Ustav, Prague (Czechoslovakia).
M. Cislerova, and P. Hutchinson.
Hydrological Sciences Bulletin, Vol 19, No 4, p 423-434, December 1974. 8 fig, 6 ref.

Descriptors: *Rainfall, *Rain gages, *Network design, Systems analysis, Runoff, Precipitation(Atmospheric), Water resources, Statistical methods, Data processing, Annual.
Identifiers: *Zambia.

Because of an acute shortage of long term discharge records in Zambia, the design of water resource systems depends heavily on the available records from the raingage network. A critical appraisal was therefore made of this network, in which only 116 gages have records of 30 years or more. A basis for the redesign of the raingage network was also provided, which will double the number of gages from 500 to 1000 to bring the density up to the WMO recommended standard. The analysis was based on the application of the statistical characteristics of random fields, i.e., of structure, covariance, and correlation functions, through the criterion of the maximum admissible interpolation error. It was shown that a compromise set of criteria are required to provide a rational and practical design. (Jones-ISWS)
W75-06268

7B. Data Acquisition

PROBLEMS AND TECHNIQUES IN SAMPLING WATER FOR ANALYSIS,
Forest Service (USDA), Parsons, W.Va. Timber and Watershed Lab.
For primary bibliographic entry see Field 5A.
W75-05931

APPARATUS FOR SAMPLING LIQUIDS,
Dow Chemical Co., Midland, Mich. (assignee)
G. R. Wessels.
U.S. Patent 3,826,144. Issued July 30, 1974. Official Gazette of the United States Patent Office, Vol 924, No 5, p 1160, July 30, 1974. 1 fig.

Descriptors: *Patents, Liquids, Equipment, *Water sampling.
Identifiers: Containers.

Equipment is described for collecting liquids, particularly water. Included is a platform which supports one or more open-end containers. A rigid bar is positioned upright to the platform and the lower end of the bar is fastened into the platform. A line is used to raise and lower the unit into a liquid body to collect the sample in the containers. As the liquid fills each container, the apparatus is raised to the surface and a hinged closure assembly seals the open end of each container. (Prague-FIRL)
W75-05945

THE TORLESSE STREAM VORTEX-TUBE SEDIMENT TRAP,
Lincoln Coll. (New Zealand). Tussock Grasslands and Mountain Lands Inst.
For primary bibliographic entry see Field 2J.
W75-05954

MEASUREMENTS OF SEDIMENT OXYGEN DEMAND CHARACTERISTICS OF THE UPPER ILLINOIS WATERWAY,
Illinois State Water Survey, Urbana. Water Quality Section.
For primary bibliographic entry see Field 5B.
W75-05972

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
For primary bibliographic entry see Field 8B.
W75-05974

EXTRAPOLATION OF STAGE-DISCHARGE RELATIONS FOR FLOOD COMPUTATIONS,
Swiss Federal Inst. for Snow and Avalanche Research, Davos-Weissfluhjoch.
For primary bibliographic entry see Field 4A.
W75-05976

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
For primary bibliographic entry see Field 8B.
W75-05977

PROBLEMS OF NUCLEAR GAUGING OF SUSPENDED SEDIMENT CONCENTRATION,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2J.
W75-05978

NITRIC OXIDE, WATER VAPOR, AND OZONE IN THE ATMOSPHERE AS MEASURED IN SITU FROM AN AIRCRAFT,
National Aeronautics and Space Administration, Cleveland, Ohio. Lewis Research Center.
For primary bibliographic entry see Field 5A.
W75-06017

PROBLEMS IN MEASURING TURBIDITY AS A WATER QUALITY PARAMETER,
Scripps Institution of Oceanography, La Jolla, Calif.
For primary bibliographic entry see Field 5A.
W75-06022

SAMPLING METHODS FOR MICROBIOLOGICAL ANALYSES,
Maryland Univ., College Park. Dept. of Microbiology.
For primary bibliographic entry see Field 5A.
W75-06037

INSTRUMENTS FOR INVESTIGATION OF FOGS AND CLOUDS AND MEASUREMENT OF HUMIDITY,
For primary bibliographic entry see Field 2B.
W75-06041

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
For primary bibliographic entry see Field 7C.
W75-06045

MODIFICATION OF A COMMERCIAL INSTRUMENT FOR LOW TEMPERATURE ABSORPTION,
Auburn Univ., Ala. Dept. of Chemistry.
For primary bibliographic entry see Field 2K.
W75-06092

IMPROVED FIELD WATER ANALYSIS TESTS,
Army Land Warfare Lab., Aberdeen Proving Ground, Md.
For primary bibliographic entry see Field 2K.
W75-06122

RADIOMETRY OF WATER TURBIDITY MEASUREMENTS,
National Aeronautics and Space Administration, Greenbelt, Md. Goddard Space Flight Center.
For primary bibliographic entry see Field 5A.
W75-06128

DEVELOPMENT OF A SYSTEM FOR MEASUREMENT OF SURFACE CURRENTS AND OCEANIC CURRENT OBSERVATIONS,
Nova Univ., Dania, Fla. Physical Oceanographic Lab.
For primary bibliographic entry see Field 2L.
W75-06129

POLAROGRAPHIC OXYGEN SENSORS.
Midwest Research Inst., Kansas City, Mo.
For primary bibliographic entry see Field 2K.
W75-06136

SEDIMENT TRANSPORT AND EROSION IN THE FOURCHON AREA OF LAFOURCHE PARISH,
Nicholls State Univ., Thibodaux, La. Dept. of Environmental Engineering.
For primary bibliographic entry see Field 2L.
W75-06211

MEASUREMENTS OF THE DIELECTRIC PROPERTIES OF SEA WATER AT 1.43 GHZ,
Rockwell International Corp., Downey, Calif. Space Div.
For primary bibliographic entry see Field 2K.
W75-06247

STUDY TO DEFINE POINTS OF ENTRY FOR POTENTIAL CONTAMINANTS IN LIMESTONE AQUIFERS,
Alabama Univ., Huntsville. Center for Environmental Studies.
For primary bibliographic entry see Field 5B.
W75-06251

CORRECTION FOR THE WETTING LOSS OF A HELLMANN PRECIPITATION GAUGE,
Eidgenoessische Technische Hochschule, Zurich (Switzerland). Versuchsanstalt fuer Wasserbau, Hydrologie und Glaziologie.
B. Sevruk.
Hydrological Sciences Bulletin, Vol 19, No 4, p 549-559, December 1974. 4 fig, 5 tab, 30 ref.

Descriptors: *Rain gages, *Wetting, Evaporation, Precipitation gages, Measurement, Meteorology, Drying, Hydrologic aspects.
Identifiers: *Wetting losses, *Hellmann gage.

As determined by laboratory and field tests, the average wetting per event for galvanized funnels was 0.15 mm compared to 0.31-0.40 mm for painted and lacquered funnels. The scratching of the inner surface of painted or lacquered gage funnels causes an increase in wetting. After emptying the container, an average of 0.15 mm of water per event rests in the galvanized container as compared with 0.07 mm in the other containers. The total wetting losses of funnel plus container were 2.8% of rain catch for the galvanized gage and 3.8% for the painted and lacquered gages. The differences in catch between the galvanized gage and the painted and lacquered gages were smaller if the wetting losses were accounted for. In the basin of Baye de Montreux the wetting losses over a period of ten years from April to September amounted to 3.1% of the catch or to 0.35 mm per daily measurement of rain. (Jones-ISWS)
W75-06267

MINERAL SLEUTH WILL SCAN OCEAN FLOORS.
Chemical Weeks, Vol 113, No 5, p 33, August, 1973.

Descriptors: *Mineralogy, *Mining, *Oceans, *Sampling, Manganese, Copper, Nickel, Research and development, Instrumentation, Oceanography.

An underwater sled that will locate manganese, nickel and copper in undersea deposits and measure the amounts was discussed. Pulled by a steel cable from a tow slip at three to five knots, the sled glides through the water 6 to 10 feet above the ocean floor. The center-mounted television camera and the directional lamps that pivot with the camera are housed along the entire front panel of the 6 x 10 feet unit. The side-scan sonar units are mounted on the sled's dorsal fin, which stabalizes the sled. On electrical command, the sled dives to the sea floor, releases a bucket from an underside compartment to retrieve a sample and stores the material for later shipboard analysis. (Jernigan-Vanderbilt)
W75-06316

7C. Evaluation, Processing and Publication

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

INTERNATIONAL SYMPOSIUM ON MATHEMATICAL MODELS IN HYDROLOGY, WARSAW, POLAND, JULY 26-31, 1971,
Forest Service (USDA), Berkeley, Calif. Pacific Southwest Forest and Range Experiment Station.
For primary bibliographic entry see Field 2A.
W75-05934

THE AUSTRALIAN REPRESENTATIVE BASINS PROGRAMME,
Commonwealth Scientific and Industrial Organization, Canberra (Australia). Div. of Land Use Research.
For primary bibliographic entry see Field 7A.
W75-05953

A NONLINEAR TIME VARIANT RAINFALL-RUNOFF MODEL FOR AUGMENTING MONTHLY DATA,
Purdue Univ., Lafayette, Ind. School of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-05957

RELIABILITY OF BED-LOAD SAMPLING,
Research Inst. for Water Resources Development, Dudapest (Hungary). Dept. of Surface Waters.
For primary bibliographic entry see Field 2J.
W75-05979

ASSESSMENT OF 1966 PEAK DISCHARGE OF THE MEKONG AT VIENTIANE,
Economic Commission for Asia and the Far East (UN), Bangkok (Thailand). Mekong Committee Secretariat.
For primary bibliographic entry see Field 2E.
W75-05987

A SYSTEMS APPROACH TO MARINE POLLUTION MONITORING,
Washington Univ., Seattle. Dept. of Oceanography.
For primary bibliographic entry see Field 5A.
W75-06024

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME II - DATA ACQUISITION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32796, $3.75 in paper copy, $2.25 in microfiche. Report No. JSC-08638, November 1973. 25 p, 5 fig, 4 tab, 9 ref.

Descriptors: *Information retrieval, *Maps, *Remote sensing, *Satellites(Artificial), Weather data, Data collections, Analytical techniques, Surface waters.
Identifiers: ERTS-1, *Multispectral scanner.

The ERTS-1 multispectral scanner (MSS) provides repetitive coverage of the same area on the earth's surface once each 18 days. In addition, many areas of the United States are covered by a multiplicity of maps varying considerably in scale, reliability, and currency. The computer-aided procedure for detection and location of surface water requires selected data from both these sources--ERTS-1 and maps. Selection of the best data from available sources is critical, because the quality of data used directly affects the accuracy and usability of output from the procedure. Volume II contains a description of the data required and a discussion of where and how these data can be obtained. (See W75-06043 thru W75-06045) (Sims-ISWS)
W75-06042

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME III - CONTROL NETWORK ESTABLISHMENT.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32797, $4.25 in paper copy, $2.25 in microfiche. Report No. JSC-08451, November 1973. 43 p, 18 fig, 9 ref, append.

Descriptors: *Maps, *Remote sensing, *Analytical techniques, Locating, Satellites(Artificial), Surface waters, Data processing, Data collections.
Identifiers: ERTS-1, Multispectral scanner.

The ERTS-1 satellite circles the earth every 103 minutes in a near-polar, sun-synchronous orbit. During each south-bound (daylight) pass, the multispectral scanner (MSS) onboard can produce a digital image of the earth's surface radiance in a continuous swath 185 kilometers (100 nautical miles) wide. The MSS digital data are recorded in a dynamic, scanner-oriented, coordinate system. To allow mapping and direct correlation with information from other sources, MSS data must be transformed into a static, earth-oriented coordinate system. The approximate coefficients for such a transformation may be derived from system measurements of spacecraft orbit and attitude and of scanner geometry. Exact transformation coefficients must be computed from a network of control points for which both scanner and earth-oriented coordinates are known. Volume III contains a description of the steps related to the establishment, measurement, and validation of a control network for use in transforming ERTS-1 data into an earth-oriented reference system. (See also W75-06042) (Sims-ISWS)
W75-06043

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME IV - COMPUTER PROGRAM DESCRIPTION AND USERS' GUIDE.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32798, $7.50 in paper copy, $2.25 in microfiche. Report No. JSC-08452, November 1973. 230 p, 6 fig, 11 ref, 6 append.

Descriptors: *Computer programs, *Remote sensing, *Mapping, Maps, Data processing, Surface waters, Analytical techniques, Satellites(Artificial).
Identifiers: ERTS-1, Multispectral scanner.

The detection and mapping (DAM) computer package was designed to detect and map surface water by using ERTS-1 multispectral scanner data from system-corrected computer compatible tapes. Volume IV contains a detailed description of the computer programs related to the procedure, along with an in-depth discussion of the computer input deck setup associated with each program. Appendixes contain program listings of the main program, subroutines, and test data. (See also W75-06042) (Sims-ISWS)
W75-06044

PROCEDURES MANUAL FOR DETECTION AND LOCATION OF SURFACE WATER USING ERTS-1 MULTISPECTRAL SCANNER DATA, VOLUME V - INFORMATION CORRELATION AND INTERPRETATION.
National Aeronautics and Space Administration, Houston, Tex. Lyndon B. Johnson Space Center.
Available from the National Technical Information Service, Springfield, Va 22161 as N74-32799, $3.75 in paper copy, $2.25 in microfiche. Report No. JSC-08639, November 1973. 34 p, 17 fig, 8 ref.

Descriptors: *Mapping, *Surface waters, *Remote sensing, *Analytical techniques, Satellites(Artificial), Maps, Information exchange, Computers.
Identifiers: ERTS-1, Multispectral scanner.

Information correlation and interpretation is the final phase of the computer-aided procedure for detection and location of surface water. This phase consists of the use of the computer-generated output to produce an inventory of surface water. Volume V contains a detailed discussion of the steps involved with the manual processing of the output from the computer programs, a description of the methodology required for correlation of this information to base maps, and a discussion related to the interpretation of the correlated information as it pertains to the national program of inspection of dams. (See also W75-06042) (Sims-ISWS)
W75-06045

FINITE ELEMENT SOLUTIONS FOR THE EQUATIONS OF GROUNDWATER FLOW,
Desert Research Inst. Nevada Univ., Reno.
For primary bibliographic entry see Field 2F.
W75-06083

FLOOD PLAIN INFORMATION: FEMME OSAGE CREEK, ST. CHARLES COUNTY, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06107

FLOOD PLAIN INFORMATION: HINKSON CREEK AND TRIBUTARIES AND BEAR CREEK, COLUMBIA, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06108

FLOOD PLAIN INFORMATION: ROCK CREEK, INDEPENDENCE, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06109

FLOOD PLAIN INFORMATION: ONE HUNDRED AND TWO RIVER, ST. JOSEPH, MISSOURI.
Army Engineer District, Kansas City, Mo.
For primary bibliographic entry see Field 4A.
W75-06110

THE CASE FOR FLOOD-PLAIN MAPPING IN AUSTRALIA,
New South Wales Univ., Kensington (Australia). School of Civil Engineering.
D. H. Pilgrim, and A. J. Askew.
Water Research Foundation of Australia Report No 43, October 1974. 36 p, 2 fig, 32 ref.

Descriptors: *Flood plains, *Mapping, *Australia, *Flood data, Flood damage, Flood protection, Flood frequency, Project planning, Regional development, Legislation.

The floods of 1973-4 in Australia have emphasized the existence of many valuable areas of the country which are subject to flooding of various frequencies and severities. Measures designed to deal with this risk require large amounts of data, and flood-plain mapping is one of the most effective ways of assembling and processing such data. The system employed in the United States provides a model for a national program for which Australia has the data and expertise. Development of such a program would require complementary State and Federal legislation, and should be accompanied by an active publicity campaign to ensure that potential flooding is always taken account of in planning land development. (CSIRO-Aust)
W75-06114

DETERMINATIONS OF AN OPTIMAL IUH FOR LINEAR, TIME INVARIANT SYSTEMS FROM MULTI-STORM RECORDS,
Technion-Israel Inst. of Tech., Haifa. Faculty of Civil Engineering.
For primary bibliographic entry see Field 2A.
W75-06127

WSP2-WATER SURFACE PROFILE PROGRAM, USER'S GUIDE,
Soil Conservation Service, Washington, D.C.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161, as PB-233 774, $3.75 in paper copy, $2.25 in microfiche. USDA/DF-73-021a, November 1973. 35 p, 1 fig.

Descriptors: *Flood profiles, *Flow profiles, *Computer programs, Flow, Bridges, Floods, Open channels, Flow rates, Profiles, Data processing, Flood flow, Channel flow.

The computer program WSP2 aids in the determination of flood characteristics for a given set of physical conditions. It can compute water surface profiles in open channels. This job requires a large amount of physical data, such as valley shape, roughness, restrictions, etc., to be described. The program consists of a main program and 61 sub-

programs. With one exception, it was written in Fortran IV programming language and developed on an IBM 360/65 computer. Some agencies have adopted it to other computers. The program requires about 220 kilobytes of core storage. It also requires three temporary data files. Specific information about the data files is on comment cards at the beginning of the program listing. (Dawes-ISWS)
W75-06186

DESIGN AND ASSEMBLY OF AN AUTOMATIC HYDROLOGIC DATA ACQUISITION SYSTEM,
Massachusetts Univ., Amherst. Water Resources Research Center.
For primary bibliographic entry see Field 7A.
W75-06197

PREDREDGING ANALYSIS OF LAKE LANSING, MICHIGAN,
Michigan State Univ., East Lansing. Dept. of Fisheries and Wildlife.
For primary bibliographic entry see Field 2H.
W75-06199

HYDROLOGIC DATA: 1973; VOLUME IV: SAN JOAQUIN VALLEY.
California State Dept. of Water Resources, Sacramento.
Bulletin 130-73, September 1974. 243 p, 5 append.

Descriptors: *Hydrologic data, *Water resources, On-site data collections, On-site investigations, Surveys, Sampling, Documentation, Climatic data, Hydrologic aspects, *California, Climatology, Surface waters, Groundwater, Measurement, Water quality.
Identifiers: San Joaquin Valley(Calif).

Tables showed data on climate, surface water flow, groundwater levels, and surface and groundwater quality in the San Joaquin Valley for the 1972-1973 water year. Figures showed location of climatological, surface water, and surface water quality measurement stations; fluctuation of water levels in selected wells and areas; and electrical conductance at selected stations. Plates showed the piezometric surface for spring 1973, well locations, and geological maps and cross sections. (Jess-ISWS)
W75-06208

COMPARISON OF OBSERVED ESTUARINE TIDE DATA WITH HYDRAULIC MODEL DATA BY USE OF CROSS-SPECTRAL DENSITY FUNCTIONS,
New York City-Rand Inst., N.Y.
For primary bibliographic entry see Field 2L.
W75-06209

VAPORIZATION RESPONSE OF EVAPORATING DROPS WITH FINITE THERMAL CONDUCTIVITY,
Propulsion Sciences, Inc., Melville, N.Y.
For primary bibliographic entry see Field 2D.
W75-06215

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

TR-20 PROJECT FORMULATION--HYDROLOGY, COMPUTER PROGRAM USER'S MANUAL,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 778, $6.25 in paper copy, $2.25 in microfiche. Technical Release No. 20, (USDA/DF-73-020a), May 1965. 171 p, 4 fig.

Descriptors: *Computer programs, *Hydrology, *Flooding. Drainage, Storms, Hydrographs, Flood routing, Runoff, Rainfall.

The computer program in Fortran II for IBM 7090/7094 equipment was developed for hydrologic processes in project formulation. The program computes surface runoff resulting from any synthetic or natural rainstorm. It will take into account conditions having a bearing on runoff and will route the flow through stream channels and reservoirs. It will combine the routed hydrograph with those from other tributaries and print out the peak discharges, their time of occurrence and the water surface elevation for each at any desired cross section or structure. In addition, it will print out the coordinates of the routed hydrograph together with the corresponding elevation of each if requested. The program provides for the continuous analyses of nine different storms over a watershed under present conditions, and with various combinations of land treatment floodwater-retarding structures and channel improvement. It will perform these routings through as many as 120 reaches and 60 structures in any one continuous run. Input and output data for a run of a sample watershed were included as exhibits. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06219

ECON2, PROJECT FORMULATION--ECONOMICS--COMPUTER PROGRAM USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 780, $3.25 in paper copy, $2.25 in microfiche. Report No. USDA/DF-73-019a, 1973. 22 p.

Descriptors: *Computer programs, *Flood damage, *Flooding, Economics, Floodwater.

The ECON2 Floodwater Damage Program will compute the average annual damages to crops, pastures, other agriculture, roads and bridges, urban areas, etc., where floodwater damages can be related to flood depths or elevations. This is an adaptation of the latest version of the Central Technical Unit's Economics Program (ECON-2, dated 3-14-68) and is limited to (1) the frequency evaluation method, (2) damages related to depth of flooding, and (3) a maximum of 10 flood events. The number of reaches may vary from 1 to 100 and a maximum of 120 cross sections per run. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06220

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
R. E. Maclay.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 776, $4.25 in paper copy, $2.25 in microfiche. Technical Release No. 48, (USDA/DF-73-022a), February 1971. 59 p, 6 fig.

Descriptors: *Computer programs, *Hydrology, *Dams, *Damsites, Hydraulics, Analysis, Water storage, Hydrographs, Structures, Spillways, Flood routing.

DAMS2 is a revision of a Fortran IV computer program (DAMS, issued November 1967) that facilitates the hydraulic and hydrologic analyses of floodwater retarding structure sites. The program uses the sites' storage-discharge capacities to floodroute inflow hydrographs through a potential reservoir. Storage and discharge capacity may be computed by the program or loaded as input data. Inflow hydrographs may be actual or developed from any storm rainfall distribution. The program will compute embankment quantities if desired. The input data for a job is printed out as it is loaded and edited for such things as invalid characters in the data fields, missing data required for a run, and unreasonably large or small data values where possible. A liberal amount of user options and program control are provided for greater application flexibility. Sample input and output data were included. The computer program is available on magnetic tape. (Sims-ISWS)
W75-06221

SUBSURFACE WATER DATA OF THE UPPER MICHIGAN REGION, PROJECT SANGUINE.
Eckbo, Dean, Austin and Williams, San Francisco, Calif.
For primary bibliographic entry see Field 4B.
W75-06236

DETERMINATION OF SNOW WATER EQUIVALENT AND SNOWMELT WATER BY THICKNESS OF SNOW COVER DATA,
Research Inst. for Water Resources Development, Budapest (Hungary).
For primary bibliographic entry see Field 2C.
W75-06272

A COMPACT WATERSHED MODEL SYSTEM,
Aston Univ., Birmingham (England).
For primary bibliographic entry see Field 2A.
W75-06286

CORRELATION ANALYSIS OF THE CELLULAR STRUCTURE OF STORMS OBSERVED BY RAINGAUGES,
Lancaster Univ., Bailrigg (England). Dept. of Environment Sciences.
For primary bibliographic entry see Field 2B.
W75-06293

8. ENGINEERING WORKS

8A. Structures

METHODS AND MACHINES.
For primary bibliographic entry see Field 5E.
W75-05942

HIGHLIGHTS OF FLOOD PROTECTION WORKS DONE ON RIVER NARMADA AT HOSHANGABAD IN MADHYA PRADESH STATE - INDIA,
Madhya Pradesh Government Control Board for Major Projects, Bhopal (India).
For primary bibliographic entry see Field 4D.
W75-05998

DEVELOPMENT OF A FLOOD CONTROL AND POLLUTION CONTROL PLAN FOR THE CHICAGOLAND AREA: SUMMARY OF TECHNICAL REPORTS.
Cook County Flood Control Coordinating Committee, Chicago, Ill.
Metropolitan Sanitary District of Greater Chicago, August 1972. 111 p, 27 fig.

Descriptors: *Water pollution control, *Flood control, *Combined sewers, *Storage, *Urban runoff, *Underground storage, Storm drains, Retention, Tunnel construction, Conveyance structures, Drainage engineering, Alternate planning, Planning, Project planning, Underflow, Surface runoff, Illinois, Hydraulic structures.

Identifiers: *Chicago(Illinois).

After evaluating many alternative plans for alleviation of water pollution and flooding problems in Metropolitan Chicago, the Flood Control Coordinating Committee recommended for implementation the Chicago Underflow Plan. Under this plan, underground facilities would be constructed for temporary storage of surface runoff from rainstorms equivalent to the most severe in recorded history. The plan calls for 120 miles of conveyance tunnels (ranging from 10 feet to 42 feet in diameter) intercepting 640 sewer overflow points in the 375 square mile area served by combined sewers. Most of the conveyance tunnels will be constructed in Silurian Dolomite rock formations 150 to 290 feet below the surface of the waterways. Smaller conveyance tunnels will be constructed in the clay overburden. Excavation for the primary reservoir is to be performed by the quarry method. It will be 330 feet deep, 500 to 1200 feet wide and about 2.5 miles long and divided into three basins having a storage capacity of 57,000 acre-feet. Combined sewer overflow water will remain in storage for up to 50 days for the largest storm periods of record. Most of the storms will be dewatered in from 2 to 10 days. Floating aerators will keep the water in a fresh odorless condition. An underground pumping station will first dewater the tunnel system into the reservoir and then the reservoir to the West-Southwest Treatment Plant, in the post storm period. To remove the sludge, a floating hydraulic dredge will be employed. Sludge pumps in the underground pumping station will discharge to the treatment plant. The total project cost was estimated at $1.22 billion. (Poertner)
W75-06047

CITY OF TORONTO WATER DISTRIBUTION SYSTEM, PROGRESS REPORT NO. 1,
Toronto Dept. of Public Works (Ontario).
R. M. Brenner.
August 1974. 22 p, 10 fig, 11 tab.

Descriptors: *Water distribution(Applied), *Water conveyance, *Water supply development, *Municipal water, *Canada, Urbanization, Planning, Materials engineering, Water supply, Pipelines, Hydraulic conduits, Piping systems.
Identifiers: *Toronto(Ontario), Water meters.

Accomplishments in planning and implementing improvements to the city of Toronto municipal water distribution system are reported for the 5-year period 1968-1972, inclusive. A computer analysis was made of the water system. Apparently, Toronto was the first municipality to analyze an entire water distribution system of this size by computer. Up to the end of 1972, approximately $3,900,000.000 of watermain improvements have been implemented. A total of 9.9 miles of new watermains have been installed and 28.5 miles of existing mains have been cleaned and lined. This program has enabled the City's water system to maintain adequate pressure for both domestic consumption and fire fighting. The computer analysis permitted a microscopic examination of the ability of every part of the water system to supply adequate quantities of water for both domestic service and fire protection. Examination confirmed that the system is basically sound and sufficiently resilient to keep abreast of the City's changing needs. It is recommended that the City Council approve: (a) programmed improvements during 1975 to 1977, inclusive; (b) making reviews of the water system at 5-year intervals; (c) the recommended design and maintenance policy; (d) not extending the high pressure fire fighting system; (e) replacing of obsolete water meters; and (f) other specific measures. (Poertner)
W75-06057

ENVIRONMENTAL CRITERIA FOR RECLAMATION PROJECTS,
Bureau of Reclamation, Washington, D.C.
E. A. Seaman.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington D.C. p 41-46, 5 ref, 1 append.

Descriptors: *Attitudes, *Environmental effects, *Design criteria, *Federal project policy, *Personnel management, *Administration, Water policy, Natural resources, Environmental engineering, Ecology, Psychological aspects, Public benefits, Project purposes, Leadership, Employee relations, Project planning, Social aspects, Education, Training, Water resources development, Motivation, Decision making, Federal government.
Identifiers: *National Environmental Policy Act, Environmental impact statements, Public hearings.

Before enactment of the National Environmental Policy Act of 1969 (NEPA), the Bureau of Reclamation was aware of certain needs for considering the natural environment in water resource development and the management of these resources. Great progress was made by the Bureau by employing a wide variety of professionals to study natural resources. When it came time to implement NEPA, a sound foundation had been prepared for advancing intense treatment in all phases of environmental problems. In the area of implementation, comparisons of environmental impact statements prepared by the Bureau in 1970-71 with those prepared in 1972-73 clearly shows that the extra effort put forth by the Bureau resulted in a quality product. The Bureau has also pioneered in the field of environmental evaluation system analysis. It has staffed an Environmental Specialist in each of its regional offices as well as two key men at the Engineering and Research Center, Denver, to head up the environmental program. A solid example of the Bureau's strength, is its 'handle' on environmental policy which established the new requirement for mandatory public hearings on future environmental statements. As a result of developing new attitudes, the Bureau has made significant adjustments in its funding, staffing, and planning to carry out the environmental program. Management has made significant efforts to acquaint the Bureau's staff with environmental considerations and the development of positive attitudes toward environmental problems. (Poertner)
W75-06067

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
W. H. Keating.
In: Environmental Policy Considerations, A compilation of papers presented at Session No. 14, 1973 American Society of Civil Engineers National Meeting on Water Resources Engineering, January 30, 1973, Washington, D.C. p 15-29, 7 fig.

Descriptors: *Environmental effects, *Water resources development, *Federal project policy, *Damsites, *Planning, Alternate planning, Project planning, Evaluation, Environmental engineering, Natural resources, Conservation, Water policy, Aesthetics, Land reclamation, Dam construction, Preservation, Fish conservation.
Identifiers: *National Environmental Policy Act.

National policy requires that federal agencies act to include in their construction projects measures to enhance and preserve the natural environment such as prevention and control of air pollutants, landscape preservation, and avoidance of destroying historic sites and recreation areas. New specification provisions dealing with reservoir and right-of-way clearing have also been effective in reducing physical and visual impact of construction activities. Designers of structures must not only provide for operating function, but for aesthetics, accommodations, fish and wildlife management, and preservation of the natural environment and water quality. Providing for fish and wildlife in any water development project is essential. Fish propagation is assured and enhanced by maintaining suitable water quality whenever possible and by providing facilities for migrating fish species. Concern over environmental protection and enhancement is a primary factor in environmental reclamation. Consideration for pleasant surroundings, and for perpetuation of ecosystems has risen sharply on the scale of values by which we evaluate human existence. The Bureau of Reclamation has acted positively to include greater consideration of these factors in all design and construction of its projects. Many aspects of design and construction are aimed at providing water resource projects which are satisfactory in both function and environmental acceptability. Examples are given of several Bureau of Reclamation projects that incorporate environmental features. (Poertner)
W75-06069

CHIPPEWA RESERVOIR PROJECT NO 108, WISCONSIN (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Power Commission, Washington, D.C. Bureau of Power.
For primary bibliographic entry see Field 4A.
W75-06167

CONSTRUCTION OF A DRAINAGE TRUNK LINE SERVING ROUTES 20 FREEWAY AND INTERSTATE 80 IN PATERSON, NEW JERSEY (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Federal Highway Administration, Trenton, N.J. New Jersey Div.
Available from the National Technical Information Service, Dept. of Commerce, Springfield, Virginia, 22161, as EIS-NJ-73-0534-F, $4.75 in paper copy, $2.25 in microfiche. March 1973. 78 p, 3 map.

Descriptors: *Environmental effects, *Lateral conveyance structures, *Drainage effects, *New Jersey, Federal government, Discharge(Water), Piping systems(Mechanical), Water management(Applied), Drainage systems, Storm drainage, Urban drainage, Governments, Sewers, Flood control, Drainage water, Water control, Subsurface drainage, Surface waters, Drainage engineering, Surface runoff, Subsurface drains, Highway effects, Adoption of practices.
Identifiers: *Environmental Impact Statements, *Paterson(NJ), Non-point sources(Pollution).

This proposal calls for construction of a sixty-six inch drainage trunk line to serve State Route 20 and Interstate 80 in Paterson, New Jersey. The line will discharge into the Passaic River, eliminating the existing temporary connection which flows into the combined sanitary and storm water sewer system of the City of Paterson. By eliminating this connection, the volume of waste water which must be treated by the Paterson sewage treatment facilities will be reduced. Also, it will reduce overloading of the treatment system by heavy rains and the resulting dumping of untreated waste into the Passaic River. Discharge from the drainage line should not adversely affect the river's biota, and no increase in flood potential of the river is expected. The line will pass through Great Falls Park without any adverse effects. Construction of retention basins and alternative locations for the line were considered unfeasible alternatives. The line will be underground and will not affect the future utilization of any land. There is no significant opposition to this project. (Deckert-Florida)
W75-06168

NORFOLK HARBOR, VIRGINIA (MAINTENANCE DREDGING) (FINAL ENVIRONMENT IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
For primary bibliographic entry see Field 4A.

W75-06173

BUFFALO RIVER WATERSHED PROJECT, AMHERST COUNTY, VA. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Soil Conservation Service, Washington, D.C.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Virginia 22161, as EIS-VA-74-0017-F, $5.75 in paper copy, $2.25 in microfiche. January 2, 1974. 144 p, 18 tab, 3 map.

Descriptors: *Environmental effects, *Virginia, *Watershed management, *Land management, *Federal government, Water management(Applied), Administrative agencies, Governmental interrelations, Watersheds(Basins), Flood control, Flood protection, Water storage, Multiple-purpose structures, Recreation, Watershed Protect and Flood Prevention Act, Water supply development, Erosion control, River basin development, Habitat improvement, Soil management, Soil conservation, Dams, Dam construction, Engineering structures.
Identifiers: *Environmental Impact Statement, *Amherst County(Va).

This project proposes conservation land treatment measures, two single-purpose flood-water retarding structures, and two multiple-purpose structures for storage of flood-water, sediment, and municipal water supply. The project will provide watershed protection and flood prevention for approximately 60,500 acres of predominantly agricultural land and will provide municipal and industrial water supply for Amherst County, Virginia. Floodwater and sediment damages in the watershed will be reduced about 88% and more effective use of 750 acres of flood plain land will be provided. Fish and wildlife habitat improvement will provide additional recreational opportunities. 454 acreas of rural land will be converted to dams, spillways, and reservoirs, 5 miles of potential stream fishery will be inundated, and agricultural use of 290 acres will be intermittently interrupted by floodwaters. A number of different flood prevention and land treatment measures and various combinations thereof were considered as alternatives. This project will not significantly restrict future land use or limit productivity. There appears to be no significant opposition to this project. (Deckert-Florida)
W75-06175

MAJOR DRAINAGE PROJECT, RIVERVIEW, VICINITY OF PASCO, WASHINGTON (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Walla Walla, Wash.
For primary bibliographic entry see Field 4A.
W75-06178

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
For primary bibliographic entry see Field 8B.
W75-06212

DAMS2, PROJECT FORMULATION--STRUCTURE SITE ANALYSIS, USER'S GUIDE,
Soil Conservation Service, Washington, D.C. Engineering Div.
For primary bibliographic entry see Field 7C.
W75-06221

POLYMER-IMPREGNATED CONCRETE TUNNEL SUPPORT AND LINING,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
For primary bibliographic entry see Field 8F.
W75-06234

ICE ENGINEERING - QUANTIFICATION OF SUBSURFACE ICE THICKENING TECHNIQUES,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
For primary bibliographic entry see Field 2C.
W75-06254

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.
For primary bibliographic entry see Field 8G.
W75-06280

8B. Hydraulics

METHODOLOGY FOR IN-STREAM REHABILITATION OF A SILTED STREAM,
Idaho Univ., Moscow. Dept. of Civil Engineering.
T. L. Kelly.
M.S. Thesis, April 1974. 88 p, 36 fig, 3 tab, 35 ref, 3 append. OWRR A-032-IDA(1).

Descriptors: *Sediment transport, *Silting, Degradation(Stream), *Sediment control, Aquatic invertebrates, *Idaho, Streams, Methodology, *Desilting, Hydraulic conductivity, Standpipes, *Drops(Structures).
Identifiers: *Emerald Creek(Ida).

The purpose was to develop methodology for rehabilitating streams where the fishery and other recreational uses have been destroyed or greatly reduced by heavy silting. Using Emerald Creek in northern Idaho as a study stream, two types of in-stream modification structures, flow constrictors and drop structures, were designed, constructred and evaluated. Contour maps and thalweg profiles of the before and after modification conditions are presented for each of the five stream modification sites. Three drop structures were constructed at two sites on the upper reach of Emerald Creek, concentrating the energy of the flow and scouring a hole downstream of the structure. The flow constricting structures were designed to reduce the width and increase the depth of flow during low flow periods to increase the sediment transport capacity of the stream, thus flushing the silts and fine sands from the modified reach leaving cobble and small boulders. Gabion deflectors were used at two sites on the lower reach of Emerald Creek to constrict the flow. A method for measuring the streambed hydraulic conductivity using standpipes is suggested as a means for determining the change in bed characteristics resulting from a deposition of silt. Calibration curves for the standpipes were developed in the laboratory for future testing in the field.
W75-05851

SWELL DAMPER,
Compagnie Generale pour les Developpements Operationnels des Richesses Sous-Marines, Paris (France).
J. E. Lamy.
U.S. Patent No. 3,846,988, 4 p, 12 fig, 4 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Shore protection, *Caissons, *Energy dissipation, Equipment, Engineering structures, *Waves(Water).
Identifiers: *Wave energy damping, Swell damping, Wave action.

A device is disclosed for providing protection against swells. A curtain is formed between a volume of water in which the swell develops and a structure or a zone requiring protection. The curtain has its base immersed in the volume of water concerned and its top is located above the crest of the highest waves occurring in the volume of water. The curtain offers, for the passage of water, ducts which have a profile flared towards the structure or zone being protected and with a sufficiently steep gradient in order for the water to break away from the walls of the ducts and produce eddies which dissipate the water energy. (Sinha-OEIS)
W75-05896

INSULATED EMBANKMENT DESIGN TECHNIQUES,
Atlantic Richfield Co., New York. (assignee)
G. R. Burt, A. C. Condo, and G. R. Knight.
U.S. Patent No. 3,846,989, 12 p, 17 fig, 3 tab, 10 ref; Official Gazette of the United States Patent Office, Vol 928, No 2, p 491, November 12, 1974.

Descriptors: *Patents, *Cold regions, *Water storage, *Reservoir design, *Embankments, *Engineering structures, *Permafrost, Thermal insulation.
Identifiers: *Liquid storage.

A method is described which permits the long term continuous use of a heat emitting liquid storage system. It is comprised of a plurity of liquid storage reservoirs supported upon frozen terrain in polar regions without excessively melting and thereby destroying the support for the reservoirs. The reservoirs are thermally insulated from the frozen terrain by a thermal barrier comprised of a layer of gravel and a layer of synthetic thermal insulation. The method uses each reservoir on a given cycle comprised of an in service period and a refreeze period. The cycles are such that when one of the reservoirs is on the in service period another is on the refreeze period and the system as a whole provides continuous service. (Sinha-OEIS)
W75-05897

FLOATING WAVE BARRIER,
For primary bibliographic entry see Field 2J.
W75-05898

PRESSURE-FRACTURE GRADIENT PROBLEMS IN DEEP WELL WASTE DISPOSAL,
Alabama Univ., University. Dept. of Civil and Mineral Engineering.
For primary bibliographic entry see Field 5B.
W75-05911

VARIATION OF MAINSTREAM LENGTH WITH BASIN AREA IN RIVER NETWORKS,
California Univ., Los Angeles. Dept. of Geology; and California Univ., Los Angeles. Inst. of Geophysics and Planetary Physics.
For primary bibliographic entry see Field 2E.
W75-05960

PROCEEDINGS OF THE INTERNATIONAL ASSOCIATION FOR HYDRAULIC RESEARCH, INTERNATIONAL SYMPOSIUM ON RIVER MECHANICS, FLOOD INVESTIGATION, VOLUME 2,
For primary bibliographic entry see Field 4A.
W75-05973

A METHOD TO DETERMINE THE VECTORS OF THE AVERAGE VELOCITY FIELD IN UNIFORM FLOW,
Karlsruhe Univ. (West Germany), Theodor-Rehbock Lab. for River Improvement.
W. Siebert, and R. Muser.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 1-12.(1973) 6 fig, 2 tab, 6 ref.

Descriptors: *Flow measurement, *Instrumentation, *Laboratory tests, *Methodology, Anemometers, Velocity, Uniform

flow, Evaluation, Heat transfer, Average, Equations, Theoretical analysis, Current meters, Water, Flow characteristics, Hydraulics, Measurement.
Identifiers: Hot-film anemometry, Velocity vector.

In order to determine the direction and magnitude of the average velocity vectors in stationary water flow by means of hot-film anemometry, anemometer voltages in various positions of the hot-film were measured for each vector. By varying the magnitude and direction variables, the mathematical magnitude and direction functions corresponding to the least square error were obtained for the measurements. It was shown that by using certain types of probes, it was possible to determine three-dimensional velocity vectors by rotating the hot film about only one axis. Experiments showed that the total functions may be expressed as the product of a direction function and a magnitude function. An accuracy of plus or minus 0.7 degree for the direction and plus or minus 2% for the velocity was achieved. (See also W75-05973) (Humphreys-ISWS)
W75-05974

SHOALING MEASUREMENTS IN NAVIGABLE WATERS BY THE U.S. ARMY CORPS OF ENGINEERS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Div.
E. D. Hart.
In: Flood Investigation, Volume II; Proceedings of the International Association for Hydraulic Research Symposium on River Mechanics (4 Vol.), Bangkok, Thailand, January 9-12, 1973. Asian Institute of Technology, Bangkok, Thailand, p 73-84 (1973) 7 fig, 1 tab.

Descriptors: *On-site investigations, *Navigable waters, *Surveys, *Shoals, Instrumentation, Equipment, Measurement, Channels, Depths, Profiles, Mapping, Sites, Sonar, Fathometers, Electronic equipment, Hydrography, Sounding.

A group was established within the U.S. Army Corps of Engineers to coordinate with the Corps Districts in the development and procurement of modern, efficient hydrographic surveying systems. Objectives and accomplishments of the group to date were discussed. Considerations of automation including tangible and intangible costs were reviewed. System components of the automated hydrographic survey system were described. Features and advantages and disadvantages of each type component were discussed. A recent hydrographic survey conference involving all Corps Districts was summarized. Approximately 50% of the Corps Districts are presently utilizing electronic positioning equipment in their hydrographic surveys. Six Districts have or soon will have fully automated systems. The ultimate objective of hydrographic surveying is to provide an accurate plot of the channel depth. (See also W75-05973) (Humphreys-ISWS)
W75-05977

EFFECT OF DAMS ON FLOOD FREQUENCY,
Papua and New Guinea Inst. of Tech., Lae (New Guinea). Dept. of Civil Engineering.
For primary bibliographic entry see Field 4A.
W75-05982

MECHANISM OF BED LOAD TRANSPORT IN CHANNEL FLOWS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06010

FLOOD CONTROL MEASURES LEVEEING AND BOTTOM DEEPENING,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 4D.
W75-06013

MODELLING OF ERODIBLE CHANNELS,
Vsesoyuznyi Nauchno-Issledovatelskii Institut Vodosnabzheniya, Kanalizatsii, Gidrotekhnicheskikh Sooruzhenii i Inzhenernoi Gidrogeologii, Baku (USSR).
For primary bibliographic entry see Field 2J.
W75-06014

CRITERIA FOR USE OF RIPPLE TANKS: REFRACTION SCALE EFFECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
R. W. Whalin, and H. L. Butler.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-787 270, $3.75 in paper copy, $2.25 in microfiche. Research Report H-74-1, September 1974. 35 p, 16 fig, 2 tab, 6 ref. Project 4A061101A91D.

Descriptors: *Waves(Water), *Hydraulic models, *Theoretical analysis, *Refraction(Water waves), Surface tension, Gravity waves, Topography.
Identifiers: *Ripple tanks, *Scale effects, Ultragravity waves, Capillary waves.

A thorough investigation of scale effects arising from refraction over a variable topography was conducted with the resultant conclusion that sufficient scale effects would be present in a ripple tank to preclude any quantitative investigation of refraction effects. Even qualitative studies can be misleading because of errors in the direction of wave propagation arising from refraction scale effects. A brief discussion of possible ripple tank scales for quantitative studies led to the conclusion that although the topography might be molded to a sufficient accuracy, it would be costly and time-consuming. The measurement of ripple tank wave heights of sufficient accuracy to be useful for design purposes would be extremely difficult, if not impossible. Consequently, it is not feasible to attempt to include topographic effects in a ripple tank. Ripple tanks should only be used for their original intended purpose, namely the qualitative study of diffraction patterns around barriers surrounded by a constant water depth. (Sims-ISWS)
W75-06019

COMPUTER SIMULATION OF SEDIMENT DEPOSIT IN AN ALLUVIAL CHANNEL,
South Dakota State Univ., Brookings.
F. F. M. Chang, D. L. Richards, and Y. H. Tsai.
Preprint No. 1538, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 18 p, 4 fig, 2 append, 15 ref.

Descriptors: *Alluvial channels, *Sedimentation, *Sediment distribution, *Computer simulation, *Analog models, *Model studies, Deposition(Sediments), Sedimentation rates, Distribution patterns, River beds.

Deposition and scouring of sediment in estuaries are complicated phenomena because the sediment movements are associated with transient flow. Much work has been done in recent years to understand the phenomena by theoretical research. The specific objective of this study is to develop a computer solution to show the change in riverbed elevation at transient phases. Three basic equations describing the unsteady flow in alluvial channels can be derived from the equation of motion of sediment laden water, the equation of continuity for sediment, and the equation of continuity for water. In deriving the basic differential equations, the following assumptions are made: the sediment-laden water is substantially homogeneous, the velocity is uniform over the cross section, hydrostatic pressure prevails at any point in the channel, the channel is a wide rectangle in cross-section, and it is assumed to be sufficiently straight in the reach. The riverbed change in its transient stage can be mathematically simulated by solving three basic partial differential equations dealing with continuity of mass (sediment and water) and momentum. The exact solution is not possible but numerical method may be used for obtaining approximate solution. (Poertner)
W75-06051

STUDY OF STRATIFIED OVERFLOWS AND UNDERFLOWS,
Illinois Univ., Urbana. Water Resources Center.
For primary bibliographic entry see Field 5B.
W75-06081

STABILITY OF SINGLE-PEAKED WAVES,
Montreal Engineering Co. Ltd. (Quebec).
For primary bibliographic entry see Field 2E.
W75-06118

A GENERAL THEORY FOR FLOW IN ROUGH CONDUITS,
Washington State Univ., Pullman. Dept. of Civil Engineering.
J. A. Roberson, M. Bajwa, and S. J. Wright.
Journal of Hydraulic Research, Vol 12, No 2, p 223-240, 1974. 3 fig, 1 tab, 11 ref. NSF Grant GK-23317.

Descriptors: *Conduits, *Flow resistance, *Roughness(Hydraulic), *Open channel flow, Natural streams, Turbulent flow, Laminar flow, Viscious flow, Drag, Laboratory tests, Analytical techniques.
Identifiers: Natural roughness, Artificial roughness, *Rough pipes, *Rough channels, Smooth boundaries.

Basic laws of fluid flow such as the drag characteristics of blunt bodies, the viscous resistance of the smooth boundary, and the velocity distribution in a conduit were considered in analytical solutions for flow in rough conduits. The theory was extended for flow with nonuniform roughnesses and also for a natural type of roughness with random spacing. The results of solutions for the natural type of roughness indicated that the relative resistance of the larger roughness elements was much greater than their relative concentrations. The method presented can be utilized for predicting the resistance of natural stream beds if the roughness distribution is known and if the coefficient of drag of the roughness elements can be measured or approximated. (Bhowmik-ISWS)
W75-06120

ON FORCED OSCILLATIONS IN A ROTATING STRATIFIED FLUID,
East Carolina Univ., Greenville, N.C. Dept. of Mathematics.
L. Debnath.
Tellus, Vol 16, No 6, p 652-662, 1974. 8 fig, 13 ref.

Descriptors: *Rotational flow, *Unsteady flow, *Resonance, *Viscosity, *Stratified flow, Mathematical studies, Frequency, Analytical techniques, Model studies, Hydraulics.
Identifiers: Laplace transforms, Hankel transforms, *Oscillations, Disturbance pressure, Periodic solution, Force frequency.

The axisymmetric forced oscillations of an inviscid rotating stratified fluid confined in a finite circular cylinder were studied. An unsteady flow was generated in the fluid by harmonic oscillations of the plane ends of the cylinder. The salient features of the flow phenomena were determined by the relative magnitudes of the angular velocity of

rotation, the forcing frequency of the imposed oscillations, and the Brunt Vaisala frequency. The solution for the disturbance pressure consists of the periodic solution and the normal inertial modes. Both of these solutions are independently modified by the density stratification. The solution has a resonant behavior when the forcing frequency equals one of the resonant frequencies. A qualitative assessment of the possible effects of viscosity on the flow was made. Several interesting features of the rotating stratified flow phenomena were analyzed. The initial value problem was solved by using the joint Laplace and Hankel transformations of the second kind. (Singh-ISWS)
W75-06124

SUBMARINE UPWELLING DUE TO A STEADY THERMAL FRONT IN A VISCID FLUID,
Department of the Environment, Ottawa (Ontario). Marine Sciences Directorate.
For primary bibliographic entry see Field 2L.
W75-06131

THE MATHEMATICAL MODELLING OF RIVERS,
Imperial Coll. of Science and Technology, London (England). Dept. of Mechanical Engineering.
For primary bibliographic entry see Field 2E.
W75-06132

THE INFLUENCE OF SURFACE WAVES ON WATER CIRCULATION IN A MID-ATLANTIC CONTINENTAL-SHELF REGION,
National Aeronautics and Space Administration, Langley Station, Va. Langley Research Center.
For primary bibliographic entry see Field 2L.
W75-06137

ANALYSIS OF UNSTEADY FLOW TOWARD AN ARTESIAN WELL BY THREE-DIMENSIONAL FINITE ELEMENTS,
Kentucky Univ., Lexington. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2F.
W75-06140

THE TRANSVERSE DISTRIBUTION OF VELOCITY IN ESTUARY FLOW,
British Columbia Univ., Vancouver. Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-06206

A METHOD OF IMPROVING THE UNIFORMITY OF THE STREAM IN AN OPEN WATER-CHANNEL,
Cambridge Univ. (England). Engineering Lab.
For primary bibliographic entry see Field 2E.
W75-06207

MISSISSIPPI RIVER AND TRIBUTARIES PROJECT, PROBLEMS RELATING TO CHANGES IN HYDRAULIC CAPACITY OF THE MISSISSIPPI RIVER,
Army Engineer District, Vicksburg, Miss. River Stabilization Branch.
E. B. Madden.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 532, $3.75 in paper copy, $2.25 in microfiche. U.S. Army Engineer Waterways Experiment Station, Vicksburg, Mississippi, Technical Report 12, August 1974. 22 p, 7 fig, 10 ref.

Descriptors: *Potamology, *Mississippi River, *Flood control, Design flood, Hydraulics, Maximum probable flood, River flow, Floodways, Hydraulic structures, Flood routing, Cutoffs, Flood plains, Flood protection, Channel flow, Channel improvement, Channel morphology.
Identifiers: *Hydraulic capacity.

A major flood on the Mississippi River in the spring of 1973 produced stages which made it apparent that the prevailing stage-discharge relationship was several feet higher than the stage-discharge relationship on which the levee grades had been based in the middle portion of the Lower Mississippi River and in the Atchafalaya Basin Floodway. Adjusted flowlines were predicated on adoption of a plan for increasing the height of existing levees in order to maintain the desired degree of protection under conditions of reduced flood-carrying capacity. Raising the levees was adopted as the least costly and physically most feasible plan. This will be done in combination with attempting to develop a more effective and efficient channel. (Sims-ISWS)
W75-06212

SPATIAL AND TEMPORAL VARIATIONS IN GEOMETRIC AND MATERIAL PROPERTIES OF A NATURAL BEACH,
Northwestern Univ., Evanston, Ill. Dept. of Geological Sciences.
For primary bibliographic entry see Field 2L.
W75-06218

THE DYNAMICS OF INLETS AND BAYS,
Florida Univ., Gainesville. Coastal and Oceanographic Engineering Lab.
For primary bibliographic entry see Field 2L.
W75-06223

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-785 552, $4.25 in paper copy, $2.25 in microfiche. Miscellaneous Paper No. 4-74, June 1974. 66 p, 47 fig, 3 tab.

Descriptors: *Beaches, *Beach erosion, *Artificial beaches, *Coastal engineering, Deposition(Sediments), Hydraulics, Dunes, Equipment, Hydraulic equipment, Seashores, Shore protection, Coasts, *California.

A project at Los Angeles in 1947 was described; sandhills (relic dunes) were leveled, and the sand was used to widen the beach against erosion. The project extended from El Segundo to Venice. Water, at high pressure, was shot from nozzles onto the hills. The resulting slurry (sand suspended in water) was sluiced down to a sump or low area. An eductor drew in the slurry by siphon, and discharged it by pipeline to a surge pit. Here, the slurry moved through a surge well to a dredge pump suction. The slurry was then moved by a series of pumps and pipelines to the beach. An amount of about 14 million cubic yards was moved; the price was 22.6 cents per cubic yard (1947). The process was described in detail, and photos and drawings of the equipment and work, and aerial progress photos of the area were shown. Recommendations were made for using the method in other areas. (Sims-ISWS)
W75-06225

FLEXIBLE BREAKWATERS,
Civil Engineering Lab. (Navy), Port Hueneme, Calif.
D. B. Jones.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-786 369, $4.25 in paper copy, $2.25 in microfiche. Technical Note N-1351, September 1974. 60 p, 6 fig, 1 tab, 24 ref, append.

Descriptors: *Breakwaters, *Energy dissipation, *Attenuation, Waves(Water), Shore protection, Flexibility, Analysis, Floating, Numerical analysis.
Identifiers: Wave height, Viscoelastic materials, Transmission coefficient, Transportable breakwaters.

Logistic advantages of a floating blanket type of transportable breakwater were noted. Thin surface covers were known to be relatively ineffective as wave barriers. To more fully examine the potential of thin flexible barriers, energy dissipation in a viscoelastic solid was investigated for the first time. The linear theory was used to derive a formula which related energy dissipation in an impervious viscoelastic blanket to wave height reduction. Numerical results for a high-damping rubber indicated that energy dissipation in a thin surface cover was not significant for wave periods greater than 2 to 3 seconds. Known data on water-wave damping by shallow-draft barriers of many kinds were reviewed. These data, with relative efficiencies, were reported in an appendix. (Adams-ISWS)
W75-06232

THE APPLICABILITY OF REGIME THEORY TO TIDAL WATERCOURSES,
University of Strathclyde, Glasgow (Scotland). Dept. of Civil Engineering.
For primary bibliographic entry see Field 2L.
W75-06257

THE ANALYSIS OF INFLOW INTO SOME EXPERIMENTAL AGRICULTURAL DRAINS,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
For primary bibliographic entry see Field 4A.
W75-06273

THE EFFECT OF PERMEABLE SURROUNDS ON THE PERFORMANCE OF CLAY FIELD DRAINAGE PIPES,
Ministry of Agriculture, Fisheries and Food, Trumpington (England). Field Drainage Experimental Unit.
C. W. Dennis, and B. D. Trafford.
Journal of Hydrology, Vol 24, No 3/4, p 239-249, February 1975. 7 fig, 3 tab, 18 ref.

Descriptors: *Tile drains, *Subsurface drains, *Drainage systems, Drainage engineering, *Hydraulic models, Drainage practices, Seepage, Tiles, Clay pipes, Subsurface drainage, Europe, Percolation, Groundwater movement, Model studies, Porous media, Laboratory tests, Sinks, Agriculture.
Identifiers: *Clayware drains, *Permeable surrounds, Sand tank, Drain spacing.

The relative performances of a plain clayware drain and ones with a partial and a complete gravel surround were investigated by measuring the drain discharge rate from each during ponded conditions when installed in a sand tank. From the drain discharge, the effective radius of each drain installation was calculated and these values were used in the hodograph solution of the drainage problem to obtain steady state theoretical relationships between water-table height and drain discharge. Comparison of the values with those observed in experiments in the sand tank revealed reasonable agreement. With the values of effective drain radius for the various drain installations, the drain spacings for representative Western European conditions were calculated by using the hodograph analysis, and the results were expressed as a percentage of the spacing calculated for an 'ideal' drain. This showed that for a deep soil a partial surround, either above or below the drain, would allow an increase in spacing of some 100% as compared with the plain pipe. The corresponding figure for a complete surround is 120%. (Sanderson-ISWS)
W75-06283

8C. Hydraulic Machinery

ANTI-BACKFLOW WATER CONTROL AND SOLUTION PROPORTIONER,
V. Hechler, IV.
U.S. Patent No. 3,862,640, 9 p, 13 fig, 1 ref; Official Gazette of the United States Patent Office, Vol 930, No 4, p 1792, January 28, 1975.

Descriptors: *Patents, *Water supply, *Flow control, Municipal water, Water pressure, Potable water, Facilities.
Identifiers: Solution proportioner.

Ventable chambers in tandem with a valve between them are placed between a source of pressurized municipal water and a flow-control solution-proportioning device. The chambers have movable walls that close vents and open backflow check valves under conventional water pressures, and then open the vents and close the check valves while positive gauge pressure still exists in the water supply but which has dropped to a predetermined low positive gauge pressure or to a pressure inadequate to operate the proportioning device successfully. Resilient means are provided to control the wall movements and the venting and to predetermine the desired positive gauge pressure differential across the vents at which the respective openings and closings will occur. (Sinha-OEIS)
W75-05909

STORM AND COMBINED SEWER RESEARCH AND DEVELOPMENT,
Federal Water Pollution Control Administration, Washington, D.C.
A. Cywin, and W. A. Rosenkranz.
Preprint No. 1039, American Society of Civil Engineers, ASCE Annual and Environmental Meeting, Chicago, Illinois, October 13-17, 1969. 20 p, 9 fig, 28 ref.

Descriptors: *Research and development, *Combined sewers, *Storm runoff, *Wastewater treatment, *Overflow, *Waste storage, Water pollution control, Water quality control, Sewerage, Monitoring, Disinfection, Chlorination.
Identifiers: Sodium hypochlorite, Overflow regulators.

In the United States two basic sewerage systems are in use; the combined storm and sanitary system and the system utilizing separate conveyances for storm and sanitary wastewaters. The 'built-in' inefficiencies of both system types are quickly recognized when we consider the total drainage area waste load, because each type is designed either to exclude all, or to transport only a portion of, the surface drainage. Through federal research and development, attempts are being made to find means of improving system efficiency and minimizing untreated discharges from the systems. Projects within the research and development program can be classified as falling within one of three categories: control, treatment or a combination of the two. Projects in the control category include storage within the system, control of infiltration of surface and groundwater into the system, and new overflow regulators for combined sewer operations. The use of polymers to improve sedimentation rates in connection with combined sewage retention-treatment facilities and the utilization of sodium hypochlorite to disinfect storm flow are two projects evaluating new treatment methods. Results indicate that a combination of both storage and treatment will most likely be required in many combined sewer systems. (Poertner)
W75-06049

AERATION OF FLOW BELOW NAVIGATION DAMS-ST. PAUL DISTRICT,
H. W. Harich.
Preprint No. 1561, American Society of Civil Engineers, ASCE Annual and National Environmental Engineering Meeting, St. Louis, Missouri, October 18-22, 1971. 11 p, 6 fig, 4 tab.

Descriptors: *Dams, *Movable dams, *Dam design, *Dam failure, *Flow control, *Gates, *Aeration, Overflow, Locks, Bulkhead gates, Hydraulic gates, Hydraulic structures, Minnesota.
Identifiers: Navigation dams, St Paul District.

After completion of the nine-foot channel navigation projects on the Mississippi River in the St. Paul District, two operation-related problems developed: namely, keeping the gates movable during the winter-time and preventing fish kill in the side channels. In search of a solution for the above difficulties, experiments were initiated to reduce the number of gate movements required, and to aerate the water in the secondary channels cut off from the flow in the river by earth dams or spillways. Tests were conducted at eight of the thirteen locks and dams in the St. Paul District. The submergible tainter and roller gates, as designed for the navigation dams, were deficient and merely skimmed the ice during the winter months and were not adequate to discharge fluctuating flows during the winter periods. Inserting bulkheads in the gates overcame the deficiency somewhat and accomplished two purposes; it kept the gates comparatively free of ice and aerated the water downstream, benefitting fish and wildlife. The practice has been discontinued because of additional maintenance costs. (Poertner)
W75-06054

WATER INTAKE AND PUMP STATION OF CITY OF CHESAPEAKE, VIRGINIA (NORTHWEST RIVER) (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District, Norfolk, Va.
Available from National Technical Information Service, U.S. Dept. of Commerce, Springfield, Va 22161, as EIS-VA-73-1699-F, $5.75 in paper copy, $2.25 in microfiche. October 25, 1973. 132 p, 14 fig, 4 tab.

Descriptors: *Environmental effects, *Estuarine environment, *Withdrawal, *Virginia, *Rivers, Water supply, Water allocation(Policy), Estuaries, Encroachment, Saline water-freshwater interfaces, Saline water intrusion, Water supply development, Water demand, Water management(Applied), Water policy, Water sources, Water utilization, Water quality control, Comprehensive planning, Water resources development, Sounds, Diversion, Exploitation.
Identifiers: *Environmental Impact Statements, *Chesapeake(Va).

This proposal calls for construction of a water intake and pump station on the Northwest River in the City of Chesapeake, Virginia. The project is a temporary measure designed to supply the water needs of the city's 90,000 people until a regional water supply system is developed. The city is presently dependent upon surplus water from neighboring water systems to meet its water needs. The Northwest River empties into Currituck Sound, which is part of the second largest estuarine complex on the east coast. The project site is located in a low swamp area, heavily vegetated with hardwoods which provide habitat for wildlife. The project will relieve local public health problems and will reduce local water supply costs. Temporary adverse effects will be the denudation of one acre of wildlife habitat and minor destruction of benthic organisms. Protective measures have been incorporated to avoid possible adverse effects upon the ecology of the sound due to removal of part of the freshwater input into the estuarine complex. This project is deemed the only feasible solution to Chesapeake's immediate water supply problem. There is some environmental opposition to the project due to the possible adverse effect upon the estuarine complex. (Deckert-Florida)
W75-06179

CENTRAL DADE COUNTY, FLORIDA (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Environmental Protection Agency, Atlanta, Ga. Region IV.
For primary bibliographic entry see Field 5D.
W75-06183

HYDRAULIC METHOD USED FOR MOVING SAND AT HYPERION BEACH EROSION PROJECT, EL SEGUNDO, CALIFORNIA.
Coastal Engineering Research Center, Fort Belvoir, Va.
For primary bibliographic entry see Field 8B.
W75-06225

8D. Soil Mechanics

CHANGED SPOIL DUMP SHAPE INCREASES STABILITY ON CONTOUR STRIP MINES,
Forest Service (USDA), Berea, Ky. Northeastern Forest Experiment Station.
For primary bibliographic entry see Field 5G.
W75-05921

MAINTENANCE OF MAMARONECK HARBOR, N.Y. (FINAL ENVIRONMENTAL IMPACT STATEMENT),
Army Engineer District. New York.
For primary bibliographic entry see Field 5G.
W75-06177

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
R. E. Nece.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 545, $4.75 in paper copy, $2.25 in microfiche. Final Report, January 1974. 85 p, 56 fig, 10 ref.

Descriptors: *Riprap, *Piers, *Bridges, *Rivers, River beds, On-site investigations, Erosion control, Hydraulics, Erosion, Scour, Stream erosion, Flood damage, Bridge construction, Bridge design, Engineering structures, *Washington.

A field study at seven bridge sites was conducted to evaluate the effectiveness of the current method of riprap protection of bridge piers used in Washington State. The method consists of using protective riprap as a streambed-level scour arrester, with the riprap being dumped into place in an excavation surrounding the pier and with the top of the riprap stone being placed at streambed level. Three solid wall and four single circular cylindrical shaft piers were studied. Field methods were described, and correlation with hydraulic data were included where possible. Generally, the method seems to have worked well, because little loss or subsidence of riprap was noted; however, some of the bridges are fairly new and have not yet been subjected to major floods. On the basis of field observations, a modification was suggested for minimizing possibilities of scour concentrations between piers. Suggestions were included for routine inspection and maintenance of bridge piers and foundations in streams, and for more early attention to hydraulic considerations in pier location. (Sims-ISWS)
W75-06228

LOADS ON BOX CULVERTS UNDER HIGH EMBANKMENTS,
Kentucky Dept. of Highways, Lexington. Div. of Research.
H. F. Girdler.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 565, $3.75 in paper copy, $2.25 in microfiche. Report No. 386, April 1974. 32 p, 30 fig, 3 tab, 12 ref. KYHPR-72-68.

Descriptors: *Culverts, *Engineering structures, *Load distribution, *Soil mechanics, Roads, Structures, Strain measurement, Strain gages, Instrumentation, Stress analysis, Loads(Forces), Pressure, Earth pressure, Mechanical properties.
Identifiers: Carlson earth pressure cells.

The structural design of culverts requires a reliable estimate of the earth pressures which will come to bear on the structure during and after construction of the embankment. The actual bearing pressure at a given time and under various conditions of differential settlement may be greater or less than the deadload of the fill or embankment over the structure. The instrumentation and construction was described of three box culverts designed by the imperfect trench method. A total of 42 Carlson earth pressure cells were installed in conjunction with strain gages and settlement measuring devices, including inverted settlement plates and mercury settlement gages. Measurements made during the first few months indicate the imperfect trench has considerably reduced the overburden loads bearing on the structures. (Sims-ISWS)
W75-06230

8E. Rock Mechanics and Geology

EFFECTIVENESS OF BRIDGE PIER RIPRAP PRACTICE IN WASHINGTON STATE,
Washington Univ., Seattle. Dept. of Civil Engineering.
For primary bibliographic entry see Field 8D.
W75-06228

ROCK STRENGTH FROM FAILURE CASES: LEFT BANK SLOPE STABILITY STUDY - LIBBY DAM AND LAKE KOOCANUSA, MONTANA,
Hamel Geotechnical Consultants, Monroeville, Pa.
J. V. Hamel.
Available from the National Technical Information Service, Springfield, Va 22161 as AD-782 874, $7.50 in paper copy, $2.25 in microfiche. Corps of Engineers, Omaha, Nebraska, Technical Report MRD-1-74, July 1974. 239 p, 35 fig, 11 tab, 46 ref, 3 append. Army Contract DACW45-70-D-0071.

Descriptors: *Dams, *Engineering geology, *Rockslides, Rock mechanics, Dam construction, Landslides, Rock properties, Structural geology, Strength, Shear strength, Mechanical properties, *Montana.

Slope stability problems involving fault and joint bounded rock masses occurred in the left abutment and left bank areas of Libby Dam during recent construction of the dam and related facilities. These problems were investigated and the results were summarized. Emphasis was placed on determination and interpretation of in situ shear strengths for geologic discontinuities in hard rock slopes. It was impossible, from a practical standpoint, to obtain the degree of geologic information needed to reliably evaluate the stability of left bank rock ribs. This was largely because of the size of the ribs and the complexity of their structural geology. Despite this lack of geologic information, several conclusions of practical importance were drawn from the investigation. These conclusions are related to (1) failure conditions for small rock wedges, (2) in situ shear strength parameters for geologic discontinuities, and (3) left bank rib stability. (Sims-ISWS)
W75-06252

8F. Concrete

LOADS ON BOX CULVERTS UNDER HIGH EMBANKMENTS,
Kentucky Dept. of Highways, Lexington. Div. of Research.
For primary bibliographic entry see Field 8D.
W75-06230

POLYMER-IMPREGNATED CONCRETE TUNNEL SUPPORT AND LINING,
Bureau of Reclamation, Denver, Colo. Engineering and Research Center.
L. R. Carpenter, W. C. Cowan, and R. W. Spencer.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-233 963, $6.25 in paper copy, $2.25 in microfiche. REC-ERC-73-23, December 1973. 162 p, 61 fig, 11 tab, 15 ref, 5 append.

Descriptors: *Precast concrete, *Tunnel design, *Concrete testing, *Concrete technology, Linings, Tunnel linings, Construction, Structural models, Testing, Hazards, Backfill, Materials testing, Economic feasibility, Heat transfer, Polymers, Construction joints.
Identifiers: *Tunnel supports.

The development of precast polymer-impregnated concrete (PIC) tunnel support-liner systems was reported. Investigations included: (1) full-scale tests of conventional concrete and PIC segments with concrete backfill as well as PIC segments with sand backfill; (2) economic studies to compare precast conventional concrete and PIC systems; (3) the effects of joint configuration, elastomeric joint sealer, and segment material on the support-lining system strength determined by laboratory tests and statistical inference; (4) heat transfer analysis employing finite differences to determine temperature distribution in the PIC lining caused by transportation tunnel fires; (5) determination of effects of elevated temperature on the compressive strength and the heat transmission characteristics of PIC; and (6) determination of flame spread, fuel contribution, smoke developed, the combustion gases, and visual damage of PIC resulting from exposure. (Sims-ISWS)
W75-06234

8G. Materials

POROUS POLYETHYLENE IN SEWAGE AND WATER TREATMENT PLANTS.
For primary bibliographic entry see Field 5D.
W75-05943

CRITERIA FOR USE OF RIPPLE TANKS: REFRACTION SCALE EFFECTS,
Army Engineer Waterways Experiment Station, Vicksburg, Miss. Hydraulics Lab.
For primary bibliographic entry see Field 8B.
W75-06019

MECHANISATION OF NEW TYPE OF COPPER CORROSION IN WATER,
Department of Scientific and Industrial Research, Petone (New Zealand). Chemistry Div.
G. G. Page, P. C. A. Bailey, and G. A. Wright.
Australian Corrosion Engineering, Vol 18, No 11/12, p 13-19, November/December, 1974. 5 fig, 1 tab, 32 ref.

Descriptors: *Corrosion, *Copper, *Tubes, *Electrochemistry, Chemical reactions, Silica, Colloids, Gels, Copper compounds, Metal pipes, Anodes, Water properties, Laboratory tests.

A review is presented of investigations into a new type of corrosion found in copper tubing used for conveying soft, potable water. The corrosion form is characterized by anodic areas on the metal surface, covered by a green-blue floc of copper hydroxide. The mechanism was deduced from test rack observations, corrosion potential measurements, decantation of water from test pipes, and cyclic voltametry. Electrophoretic deposition of colloidal silica on the surface cuprous oxide film forms a gel layer which traps corrosion products and generates active anodic sites shielded from the ingress of oxygen. Differential aeration then leads to anodic dissolution of copper, followed by precipitation of amorphous copper hydroxide in the soft, unbuffered water. Necessary conditions for the occurrence of this type of corrosion, and methods of reducing its incidence, are described and discussed. (CSIRO-Aust)
W75-06111

IN-SITU PERMEABILITY ANALYSIS USING BAROMETRIC PRESSURE FLUCTUATIONS,
California Univ., Livermore. Lawrence Livermore Lab.
For primary bibliographic entry see Field 2F.
W75-06241

FLOATING ICE SHEETS,
Foundation of Canada Engineering Corp. Ltd., Calgary (Alberta). Arctic Div.
D. M. Masterson.
The Northern Engineer, Vol 6, No 3, p 11-18, Fall 1974. 14 fig, 3 ref.

Descriptors: *Ice, Civil engineering, *Cold weather construction, *Construction, Structural engineering, Arctic, Mechanical properties, Strength, Bearing strength, Pipelines, Ice loads, Loads(Forces).
Identifiers: *Floating ice sheets.

In arctic regions, the use of natural ice cover as a load support has increased during the past several years. In addition to the roads and airstrips which have traditionally been built on ice, oil companies are now using it to support heavy drilling rigs for offshore exploration. While much scientific data on ice and its mechanical behavior have been gathered over the past years, there is little information available to the practicing engineer who needs safe, reliable, design procedures for placing heavy, long-term loads on floating ice sheets. A simple and proven method for estimating stresses and deflections beneath long-term loads was outlined. Field monitoring procedures during construction, use of flooded ice platforms and cracked ice, and problems encountered in the field were discussed. (Sims-ISWS)
W75-06280

8H. Rapid Excavation

ROCK TUNNELS RECENTLY COMPLETED IN CHICAGO,
Metropolitan Sanitary District of Greater Chicago, Ill.
J. Irons, and D. Westfall.
Paper presented at Rapid Excavation and Tunneling Conference, American Society of Civil Engineers and the American Institute of Mining, Metallurgical and Petroleum Engineers, Chicago, Illinois, June 5-7, 1972. 14 p, 7 fig.

Descriptors: *Storage, *Underground storage, *Water pollution control, *Sewers, *Combined sewers, *Storm runoff, Illinois, Overflow, Sewerage, Tunnels, Water pollution sources, Water quality control, Urbanization, Lake Michigan.
Identifiers: Combined sewer overflows, Chicago, Rock tunnel storage.

Three rock tunnel sewer systems are under construction in the Chicago area. They are designed to act independently and to eventually become part of the metropolitan area master plan. The tunnel excavation for each of the systems has been completed. The three are similar in that they have the same purpose, the same component parts and their tunnels were constructed in the nigaran limestone using a mechanical mining machine. The purpose of each of the systems is two-fold: first, to provide flood relief for existing inadequate sewer system; and, second, to reduce the pollution

load to the waterways caused by combined sewer overflows. The tunnels were constructed below the water level of the receiving waterway. Small storms are completely contained in the tunnel. Large storms fill the tunnel, then overflow to the waterway. The stored water can be removed from the tunnels in one day by pumping to an interceptor at times when the treatment plant can handle the flow. It is anticipated that the sediment in the tunnel will be flushed to wet wells during the heavier storms. Alternatively, the tunnels can be flushed with dry weather flow or with water from the public water supply. (Poertner)
W75-06061

TRANSLATIONS OF PAPERS PRESENTED AT THE THIRD PANEL ON THE PEACEFUL USES OF NUCLEAR EXPLOSIONS ORGANIZED BY THE INTERNATIONAL ATOMIC ENERGY AGENCY HELD IN VIENNA, AUSTRIA, 27-30 NOVEMBER 1972.
Technical Information Center (AEC), Oak Ridge, Tenn.
For primary bibliographic entry see Field 6G.
W75-06349

8I. Fisheries Engineering

SCREENS FOR WATER INTAKE SYSTEMS,
Rex Chainbelt, Inc., Milwaukee, Wis. (assignee)
R. F. Taylor, D. A. Strow, and H. Mansouri.
U.S. Patent No. 3,850,804, 3 p, 5 fig, 5 ref; Official Gazette of the United States Patent Office, Vol 928, No 4, p 1701, November 26, 1974.

Descriptors: *Patents, *Screens, *Fish barriers, Fishes, Debris, Equipment, Intake structures.
Identifiers: *Fish protection.

A travelling water screen unit comprises an endless series of pivotally interconnected rectangular screens. Each screen comprises a frame having ends which are attached to corresponding links of parallel chains and a screen insert which is separately fabricated and secured by bolts between the central horizontal members of the frame. The debris carried by the flow in a channel is intercepted by the lower, upward moving screens and is removed by backwash sprays from the screens approaching the upper drive and support means. Such units and their intermediate support columns may be set flush and in a straight line so that fish are readily diverted away from the screen. (Sinha-OEIS)
W75-05879

IN-CHANNEL SEDIMENTATION BASINS--A POSSIBLE TOOL FOR TROUT HABITAT MANAGEMENT,
Forest Service (USDA), St. Paul, Minn., North Central Forest Experiment Station.
E. A. Hansen.
The Progressive Fish-Culturist, Vol 35, No 3, p 138-142, July 1973. 2 fig, 24 ref.

Descriptors: *Stream improvement, Basins, *Desilting, *Trap efficiency, Fish management, Bed load, Bottom sediments, *Settling basins, *Trout, Sediment control.
Identifiers: *Fish habitat, *Sediment reduction.

Design and use of sedimentation basins for trout habitat management are discussed. Minimum basin size for trapping bedload sediments is based on Vetter's formula. Basins can remove essentially all moving bedload from a section of stream; whereas traditional 'stream improvement' measures may decrease bedload sediments up to perhaps only 50 percent. Sediment reduction programs using basins will produce the maximum possible change in streambed composition. Basins are effective for trapping sand size and larger sediment and have the advantage that they can be located immediately upstream from critical zones such as spawning areas. (Forest Service)
W75-05937

CONSTRUCTION OF RECLAMATION PROJECTS TO ENHANCE ENVIRONMENT,
Bureau of Reclamation, Washington, D.C.
For primary bibliographic entry see Field 8A.
W75-06069

THE FAST AND REALIMENTATION IN THE CARP (CYPRINUS CARPIO L.): V. THE EFFECT OF FOUR MODES OF REALIMENTATION ON GLUCIDIC METABOLISM, (IN FRENCH),
Toulouse-3 Univ. (France). Laboratoire d'Ecophysiologie des Animaux.
J.-C. Jurat, J.-P. Parent, and A. Serfaty.
Arch Sci Physiol. Vol 26, No 4, p 349-357. 1972, Illus. English summary.

Descriptors: *Carp, *Fish diets, *Metabolism.
Identifiers: *Realimination.

After 6 mo. of total inanition, young carp, can be fed by industrial granules of special food. This diet produces an increase in muslce glycogen and decrease in blood lactate. A special diet made with casein, is necessary to refeed carp after acute starvation (11 mo.) without mortality. This diet involves decreases in blood glucose and fats and heart, liver and muscle glycogen. A diet with starch gives high levels of blood glucose and lactate without significant increase of tissue glycogen. The same effects are seen after injections of glucose and amino-acids.--Copyright 1974, Biological Abstracts, Inc.
W75-06350

9. MANPOWER, GRANTS AND FACILITIES

9B. Education (In-House)

INSTITUTE FOR WATER RESOURCES (ARMY CORPS OF ENGINEERS), ANNUAL REPORT, 1972.
Institute for Water Resources (Army), Alexandria, Va.
For primary bibliographic entry see Field 6B.
W75-06018

9C. Research Facilities

ENVIRONMENTAL CONTROL LABORATORY DESIGNED FOR THE SPECIFIC NEEDS OF THE INTERN TRAINING CENTER, RED RIVER ARMY DEPOT,
Texas A and M Univ., College Station. Dept. of Industrial Engineering.
For primary bibliographic entry see Field 5A.
W75-06210

9D. Grants, Contracts, and Research Act Allotments

PROGRAM PLAN FOR ENVIRONMENTAL EFFECTS OF ENERGY,
MITRE Corp., McLean, Va.
R. P. Pikul, and R. Rabin.
Available from the National Technical Information Service, Springfield, Va 22161 as PB-235 115, $9.25 in paper copy, $2.25 in microfiche. Final Report MTR-6726, July 1974. 314 p, 35 fig, 52 tab, 95 ref. 1700. NSF 74-SP-0827.

Descriptors: *Environmental effects, *Energy, *Fuels, *Planning, Coals, Oil, Solar radiation, Oil shale, Geothermal studies, Research and development, Decision making, Geysers, Faults(Geologic), Hot springs, Social aspects, Economic impact.
Identifiers: *Energy sources, *National Science Foundation, Geothermal energy.

The National Science Foundation's initial Five Year Program plan, effective FY 1975, is basically directed to obtain scientific knowledge to sustain a sound environmental policy, to seek means to minimize adverse environmental, social, economic and cultural impacts of various fuels extraction and conversion, and energy generation and utilization. Major research emphasis is placed on pollutant analysis, pollutant transport and fate, pollutant effects, and systems evaluation, the last emphasizing information for decision-makers to clearly show the consequences of alternative development and environmental management strategies. The problem areas are identified for coal, oil and gas, oil shale, geothermal, and solar energy. Research objectives and tasks for these various energy sources include extraction, processing, transportation, conversion, utilization, and transmission. The distribution of funds for FY 1975, out of the total $47 million for the five-year period, is $2.2 million for preobligated projects, new support projects $1.1 million, program planning and evaluation $0.45 million, geothermal $1.2 million, oil shale $0.77 million, oil $0.73 million, and coal $2.5 million. (Auen-Wisconsin)
W75-05871

10. SCIENTIFIC AND TECHNICAL INFORMATION

10C. Secondary Publication And Distribution

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 5A.
W75-06039

ECOLOGICAL IMPACT OF THERMAL LOADING ON A PIEDMONT RIVER - AN ECOSYSTEM APPROACH, VOL. 2,
Virginia Inst. for Scientific Research, Richmond.
For primary bibliographic entry see Field 05C.
W75-06298

10F. Preparation Of Reviews

FLOOD ESTIMATION METHODS FOR UNGAGED CATCHMENTS-A REVIEW,
Malviya Regional Engineering Coll., Jaipur (India). Dept. of Civil Engineering.
For primary bibliographic entry see Field 04A.
W75-05992

A SURVEY OF METHODS FOR MONITORING ECOLOGICALLY IMPORTANT MICROORGANISMS IN THE MARINE ENVIRONMENT,
Connecticut Univ., Groton. Marine Sciences Inst.
For primary bibliographic entry see Field 05A.
W75-06039

MICROBIOLOGY-DETECTION OF BACTERIAL PATHOGENS AND THEIR OCCURRENCE, (LITERATURE REVIEW),
National Environmental Research Center, Cincinnati, Ohio.
For primary bibliographic entry see Field 05A.
W75-06342

WASTE OIL RECOVERY PRACTICES--STATE OF THE ART.
Environmental Quality Systems, Inc., Washington, D.C.
For primary bibliographic entry see Field 05D.
W75-06347

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CENTERS OF COMPETENCE AND THEIR SUBJECT COVERAGE

- Ground and surface water hydrology at the Illinois State Water Survey and the Water Resources Division of the U.S. Geological Survey, U.S. Department of the Interior.
- Metropolitan water resources planning and management at the Center for Urban and Regional Studies of University of North Carolina.
- Eastern United States water law at the College of Law of the University of Florida.
- Policy models of water resources systems at the Department of Water Resources Engineering of Cornell University.
- Water resources economics at the Water Resources Center of the University of Wisconsin.
- Eutrophication at the Water Resources Center of the University of Wisconsin.
- Water resources of arid lands at the Office of Arid Lands Studies of the University of Arizona.
- Water well construction technology at the National Water Well Association.
- Water-related aspects of nuclear radiation and safety at the Oak Ridge National Laboratory.
- Water resource aspects of the pulp and paper industry at the Institute of Paper Chemistry.

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- Effect on water quality of irrigation return flows at the Department of Agricultural Engineering of Colorado State University.
- Agricultural livestock waste at East Central State College, Oklahoma.
- Municipal wastewater treatment technology at the Franklin Institute Research Laboratories.

Subject Fields

1 NATURE OF WATER

2 WATER CYCLE

3 WATER SUPPLY AUGMENTATION AND CONSERVATION

4 WATER QUANTITY MANAGEMENT AND CONTROL

5 WATER QUALITY MANAGEMENT AND PROTECTION

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